amateur radio

VOL. 44, No. 4 APRIL, 1976

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COVER PHOTO

Part of the equipment at the Royal Observatory, Herstmonceaux, from whence emanates Greenwich Mean Time. See story on page 5.

— Photo printed by permission of the Royal Observatory, Herstmonceaux, Sussex, England.

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

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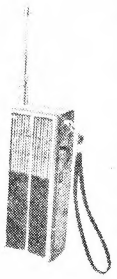

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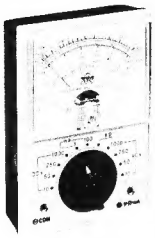

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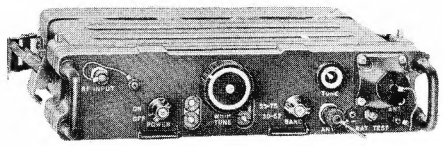

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QSP

THE INVESTIGATOR'S REPORT AND YOU

Printed in full in this issue of AR is the report by Mr. Bob Arnold, the investigator who was commissioned by the 1975 Federal Convention to enquire into the administrative, financial, and constitutional organisation of the WIA.

This report is of considerable importance to the Institute and I hope you will give it the consideration it deserves.

Do not forget that this report was commissioned to investigate the present organisation of the Institute and to offer recommendations as to any changes the author may feel appropriate and desirable, and to give us guidance in our future planning.

It is quite possible that there are some aspects of this report you do not agree with; however, because of this, do not condemn all of it.

This report advocates some very drastic changes in our organisation. Give due consideration to the object of these changes. Do you think they will be successful? What are their shortcomings? It is feasible to move away from the historic federation of State organisations to a different basic unit in an attempt to eliminate duplication of function?

At this stage it is possible that many of the implications of the report have not been realised. Do not let this deter you.

The main thing to do now is to discuss this report as widely as possible and feed back your thoughts to the WIA in order to give the Federal Council as much guidance as possible when they come to consider the report at the Federal Convention in May.

David Wardlaw VK3ADW, Federal President. ■

IARU WORLD CONFERENCE

The President of the International Amateur Radio Union, Noel Eaton VE3CJ, announced at the Region 3 Conference in Hong Kong last year that he was proposing to invite representatives of Region 1 and Region 3 to meet in Miami, Florida for an Inter-Regional Conference on April 16th and 17th, following the conclusion of the Region 2 Conference.

This will be the first time that there has been a formal meeting of the three Regional IARU Societies. It will be particularly concerned with preparations for the 1979 World Administrative Radio Conference.

In addition to representatives of the three Regions, the Conference will be attended by representatives of a number of the more important national societies including RSGB, the Italian Society and the Japanese Amateur Radio League. The WIA, which is already involved in preparations for the 1979 WARC, has decided to also be represented at that Conference by its Federal President, Dr. David Wardlaw VK3ADW.

The President of IARU has expressed the hope that the meeting will be a rather informal and free-wheeling discussion of the past and future.

The WIA's participation in the Conference is an expression of the importance that is attached to co-ordination and liaison with other national societies in the protection of the amateur services' position at the 1979 WARC. ■

EDITOR'S DESK

Bill Roper, VK3ARZ

Eight new articles were received during February for consideration for publication in AR. There are now almost thirty articles undergoing preparation but bottlenecks in technical editing have caused some lengthy delays. These delays have now been overcome, only to be replaced with some drafting delays.

Whether you are for or against repeaters, or whether you are completely indifferent, repeaters are becoming an increasingly important part of the growth and advancement of amateur radio. A new, active, and much needed Federal Repeater Committee has been formed and in this issue of AR appears the first column of a monthly series devoted entirely to REPEATERS.

Bob Arnold's report on his investigation into the organisation and management of the WIA is printed in full in this issue. It takes up a lot of space, but it is essential reading for everybody.

It is with regret, and with my deepest thanks for his past efforts, that I farewell Jim Payne VK3AZT as contributing editor to the Contests Column. Jim has done an excellent job and, particularly during the past few months, has performed under rather adverse conditions. Ken Phillips VK3AUQ has stepped into his shoes. I am sure that you will give Ken every assistance.

Deane Blackman VK3TX has had to resign as contributing editor to the Key Section column due to study leave. Thank you for your work Deane; I hope your eventual replacement does not prepare his copy on a teletype machine. It is rather hard to mark up for typesetting. Hi.

A criticism levelled against the WIA for a long time was that, for an organisation of so called communicators, we were unable to advise our members of what was happening on the national scene. I am sure that you will agree that WIANEWS, written by Business Manager Peter Dodd, is now successfully keeping you informed on what is happening in your Institute.

Next month I hope to introduce a new, periodical column devoted to information

on where to find difficult to obtain components for construction projects. Vic Pleuger VK3AVP will be compiling the material and would welcome your help.

I am sure all readers will have realised immediately that the diagrams on page 17 of March AR were accidentally interchanged. Just one of the many happenings that ages editors prematurely. ■

WIANEWS

February was a busy month for the Executive and March appears likely to be equally as busy.

The Executive established a Repeater Sub-Committee on an ad hoc basis to get repeater matters moving. This was composed of a member of the Executive as Chairman and two Melbourne amateurs well acquainted with repeater operations. The first meeting of this sub-committee was held towards the end of February to consider a range of outstanding problems and to organise liaison with Divisional repeater groups.

On January 29th members of the Executive met with Central Office for a detailed discussion on repeater conditions. Some of the long delays in obtaining licences for repeaters, methods of identifying repeaters in use, security, and access to repeaters were the major items discussed. The Department insisted upon repeater idents and suggested a preferred method. When a repeater is co-sited at a location where other services operate or will be operating it was accepted that somewhat more stringent conditions had to be applied to avoid RFI than would be necessary for a repeater located far distant from any other services.

The Department committed their requirements to writing on 3rd February advising also that measures were being implemented by which it expects that delays in obtaining licences for this class of station will be minimised. At the same time they slipped in a new condition that applications for repeater licences must be accompanied by evidence that a significant number of licensees in the service area support the application.

At least the WIA succeeded in having removed the requirement that circuit diagrams must accompany applications. In place of this the requirement is that the repeater shall be of high standard and in accordance with good engineering practice. Log keeping was clarified in relation to repeaters as meaning maintenance log keeping.

The WIA now has to make a decision on some of these questions and advise the Department accordingly.

February saw the beginning of a most important activity. On the 25th the Federal President attended the first meeting of the Government's Preparatory Group relating to WARC 1979. Representatives attended from most of the frequency user services including broadcasting, maritime, aeronautical and defence. This was almost wholly concerned with administrative arrangements. Committee No. 2 was designated for the amateur and amateur satellite services.

In this same month much thought was given to the impending meeting in Miami during April, after the IARU Region 2 Conference, of representatives from all IARU Regions and many Societies to finalise numerous matters relating to WARC 1979. The importance of this meeting for the whole of the amateur service and the necessity to organise a strong IARU team for WARC 1979 assumes greater significance day by day. Some details of the frequency tables to be considered by R2 are set out in IARU News herein. A brief resume of the R3 plans is to be found on p. 28 of AR June 1975.

The Investigator, Mr. Bob Arnold, VK3ZBB, handed down his Report during the month. This is published in full in this issue.

Two other complex matters also received attention. The first one refers to the desirability and possibility of producing an EDP-based call book this year. This question is still under discussion. The second refers to the possibility of a WIA integration of educational instruction on a national level for all age groups by various organisations. This was linked with examination levels, syllabuses and exemptions. "What can the Institute do in the widest possible sense in this field towards meeting the undoubted demand by the public to learn about amateur radio" was the theme. A Federal Convention agenda item was approved for the suggested appointment of a qualified amateur to undertake an investigation and make recommendations.

Another Executive agenda item dealt with the establishment and adoption of WICEN net frequencies. It is anticipated that a motion arising would specify the frequencies. Some years ago the primary WICEN net frequency was 7060 kHz with the secondary frequency at 7040 kHz and national guard frequencies on 3501 and 7002 kHz.

Two Agenda items were received from the VK4 Division. One put forward the proposal that WIA membership should be a requisite for persons nominated to fill any positions on the YRCS Federal organisation. The other was an administrative suggestion relating to stamp duties on constitutionally-required legal documents.

The VK2 Division submitted 10 Agenda Items. No. 1 was that the WIA should determine uniform conditions in all Divisions for Novice membership and No. 10 that the Radio Branch be requested to alter the 2-year Novice Licence tenure so that it may be possible to grant an extension of time to some Novices if circumstances warrant it. The WIA incidentally already has a verbal assurance on this matter.

VK2's No. 3 agenda item proposed that the Radio Branch allocate new amateur bands at 48-50 GHz, 71-76 GHz, 165-170 GHz and 240-250 GHz. Their No. 4 proposed that the WIA request the removal of the lower age limit on AOLCP and AOCP licences and certificates.

Their No. 7 proposed the policy that the transmitter in any repeater installation be audibly identified while in use either by on carrier MCW or taped voice ident. Their No. 6 asked that the Federal Repeater Committee be reconstituted so that it is a "Working Committee" in one State and that a liaison person from each State Repeater Committee be a part of this FRC. No. 8 proposed that a national beacon committee similar to the FRC be set up to provide co-ordination etc. Note: The VHF Advisory Committee is already almost inundated with beacon matters.

The VK2's No. 5 proposes that the WIA undertake to advertise in other journals to promote the WIA as a recruitment aid. No. 2 proposed that a limited segment of Divisional Notes should be re-introduced into AR and finally their No. 9 suggested that the format of future call books be expanded to be similar to the NZART call book so that WIA policies, guidelines and information may be distributed to amateurs.

One of the motions laid on the table in the 1975 Federal Convention proposed that the Federal Council should determine WIA policy for amateur station operation on the 27 MHz band and provide guidelines for members in regard to co-operation with the Radio Branches for the location, identification and eventual apprehension of unlicensed stations using amateur frequencies. The VK1 Division has now provided suggested guidelines for discussion at the 1976 Federal Convention.

The Executive, having received agreement from the President of the VK3 Division, approved the appointment of Mr. K. L. Phillips VK3AUQ as Federal Contest Manager to take over from VK3AZT who is heavily involved with business commitments. It is understood that Kev. Phillips expects to receive some assistance from interested members of the Eastern and Mountain Districts Radio Club.

The distributors of the proposed IARU Region 3 bulletin asked advice about a suitable recipient of this in PNG in the absence of an IARU Society in that country. This is being researched.

The VK4 Division suggested that a special prefix for amateurs should be sought for the period July 1976 to July 1977 to celebrate 75 years of Australian Federation.

The Executive were pleased to note the resumption of amateur examinations during February and the scheduled Novice Exam for March 16th. Although a second Novice morse exam was scheduled to be held along with the AOCP morse exam on 18th May it was observed that the next complete Novice exam would not be held before November.

Arising from representations carefully detailed by the Moonbounce experts in Dapto it is anticipated that a further VK2 Agenda Item will come forward proposing some peripheral modifications to the WIA 70 cm band plan. The question of selecting suitable repeater channels for 70 cm is yet another item presently under discussions at Divisional levels presumably for injection into the 1976 Federal Convention before offering suitable advice to the P & T Department.

And finally, as if all this were insufficient for digestibility, a very detailed letter of 2nd February came from the Secretary of the ABCB in reply to the Institute's complaints in October relating to FM and TV transmitter/transponder interference problems and measures which ought to be examined to overcome these in proper design of receivers and additionally the unilateral use by Australia of TV frequencies such as Channel 5A. Copies of this letter have been circulated to Divisions. The Executive still lacks an EMC (RFI) Co-ordinator.

With excellent co-operation from the Department a temporary reciprocal licence VK1JY was obtained for State visitor JY1 for presentation to him on arrival in Canberra. Unfortunately the itinerary for JY1 did not permit time for any amateur function in Melbourne.

During a brief eyeball QSO with him at a Government House reception in Melbourne attended by the Federal and VK3 Presidents on 5th March, HRH King Hussein bin Jalal, JY1 desired that greetings be conveyed to Australian amateurs and also to IARU President Noel Eaton. At that time his temporary reciprocal licence VK1JY had not yet filtered through the system to him from Canberra, but his attention was drawn to its existence.

The Secretary of the Cyprus Amateur Radio Society writes that their Vice-President, Totos Theodossiou 5B4AP, will be visiting Sydney for four weeks from 5th April.

The editor of the NZART journal Break-In, Don Mackay ZL2RW, will be visiting Melbourne during April. ■

GREENWICH MEAN TIME

A. Shawsmith VK4SS

Contemplating a trip to the U.K. If so, you may be interested enough to take the time to visit Flamsteed House, at Greenwich, on the bank of the Thames River about 15 km from London.

Here, you will witness a small daily traditional ritual that has come to mean so much to all those whose communication, livelihood and safety depend on the accurate co-ordination of time.

At precisely 1300 hrs. London LT, a colored metal sphere drops down a mast. This signifies to all in view that the time is exactly 1 p.m. This event first occurred one hundred and forty-three years ago: i.e. in 1833, when it was recorded as the FIRST ACCURATE TIME SIGNAL IN THE HISTORY OF THE WORLD. It became known as the Greenwich Mean Time (GMT) and is now the norm against which all standard time zones are measured.

Flamsteed House, the first Royal Observatory, was named after a young amateur astronomer who was appointed by King Charles II in 1676. This famous house, in the U.K., is now an astronomical museum. In recent years, the air around it became so polluted that the operations centre of the Royal Observatory was moved to a site in Herstmonceaux in Sussex. However, the Greenwich meridian — a brass strip laid in the ground — still remains in its original position at Greenwich and if your mood is one of whimsy, you may care to straddle this strip and thereby, man-made timewise, divide yourself into two segments, 24 hours apart.

The dropping of the ball down the flagpole was done so that mariners about to set to sea could synchronize their chronometers. From this crude beginning, the world's time is now measured at Herstmonceaux, by an array of caesium atomic clocks accurate to within a few parts in ten quadrillion — such is the staggering progress in astronomy, technology and science.

From the very beginning, the Royal Observatory worked hard to establish ever more accurate daily time, in an effort to assist all those who travelled on land and sea. Soon, most of the world's ships had the zero longitude through Greenwich on their charts and finally in 1884, despite opposition from France, an international agreement was drawn up declaring the Greenwich meridian as the standard longitude and GMT as the standard time.

Much of the credit for the establishment of GMT and the bringing of it to the precise state of the art it is today, must go to the Royal Astronomer Appointees at Flamsteed House. For a period of 300 years, they were without exception, a brilliant, dedicated group, from Flamsteed who worked with one or two simple telescopes in 1676, to the present Radio Astronomer, Sir Martin Ryle.

Maintaining accurate time requires the work and effort of a large number of astronomers and scientists the world over. The staff at Herstmonceaux has continued to grow, in spite of the aid of computers. Innumerable observations are made of countless planets and stars and exacting calculations have to be made daily, for the planet Earth does not spin at a constant rate. At some periods of the year it speeds up and at other times slows down; it also wobbles slightly on its axis, from time to time. There are several reasons for this: viz. seasonal winds, tides and the 'pull' effect of sun and moon and turbulence in the Earth's core, etc. These effects and vagaries are now accurately measured and GMT is adjusted accordingly.

Besides GMT, the reader may come across GCT (Greenwich Civil Time) and also UTC (Universal Co-ordinated Time). For Amateur use, these can be regarded as one and the same, although there are periods when UTC differs very fractionally from GMT and GCT. Except for specialised tests, Hams generally in their working do not require split second accuracy but even so, next time you fill out your QSLs, give a thought to the past work at Greenwich and consider that QSO checking would be difficult without accurate UTC or Greenwich Mean Time. ■

QSP

PROVOCATION OF THE MONTH

Note on a subs notice by a resigning member — "I do not wish to continue subscribing to this magazine".

VICTORIAN DIVISION ADDRESS

Notification has been received from the Divisional Secretary of the WIA Victorian Division that the Divisional address via P.O. Box 36, East Melbourne is no longer valid. This post box will be relinquished very shortly and therefore the Divisional address for all mail is 412 Brunswick St., Fitzroy, 3065.

MAGAZINE SIZES

You may have already noticed the change in sizes of the USA amateur journals and also the W. German CQ DL from 1st January 1976. QST is now about the same size as our AR at 28 cm x 21 cm (AR is 21.5 cm wide). The editorial in Jan. '76 QST said "over a two-year span, the cost of producing an issue of QST increased nearly 75%, almost all of that increase caused by the higher price of paper. These increased costs helped to create a loss in ARRL operations of over $130,000 in 1974". Many of the magazines have gone over to the 3 column format which has been used so successfully in AR for many years.

USA VOLUNTEER EXAMINERS

"The (FCC) rules permit the examination for an Amateur licence to be administered by a volunteer examiner selected by the applicant when it is shown by a physician's certificate that the applicant is unable to appear for an FCC supervised examination because of protracted disability. The volunteer must be at least 21 years of age and the holder of a class of amateur operator licence equal to or higher than the class of licence for which the applicant is being examined". World Radio News Jan. '76.

USA REPEATERS

A note in Jan. '76 QST mentions that 220 MHz repeater activity is booming and is inevitable given the saturation of 146 MHz in many areas. "This move has been slowed by the recurring spectre of class E CB" was the comment. Incidentally the IARU R2 conference this month will be asking for 220-225 MHz as an amateur (shared) allocation for WARC 1979.

REPEATERS IN SOUTH AFRICA

The Dec. '75 issue of Radio ZS lists 34 repeaters operating in South Africa. Of these there are 33 in the 2m band where they have 9 channels with inputs between 145.000 to 145.250 MHz and outputs between 145.600 and 145.850 MHz; 25 kHz spacing and their first channel is shown as 82/130 input 145.025 output 145.625 MHz. One repeater is shown in the 6m band (which extends from 50 to 54 MHz in South Africa) for which 9 channels are allocated starting at 162/210 being 52.025 in 52.625 MHz out and ending at 178/226 being 52.225 in 52.825 out — again at 25 kHz spacing. On 70 cm no repeater is shown as operative in the 7 allocated channels beginning with 84/692 being 431.050 in, 438.650 MHz out ending at 108/176 being 431.350 in 438.950 MHz out.

NEW PREFIX

From "Radio Communication" Dec. '75 comes information that the call sign series D2A-D3Z has been allocated provisionally to Angola by the I.T.U. ■

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FROM THE SOLE AUSTRALIAN AGENTS –

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FR-101D

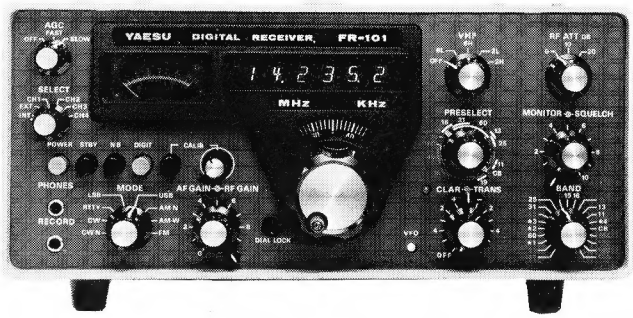

Photo shows FR-101D Digital

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Yaesu's communication technology brings you this total spectrum coverage receiver (160 - 2m plus major short wave bands). The FR-101D has the flexibility that even the most demanding amateur desires — with provision for all mode reception on twenty-one 500 kHz amteur and short wave bands. The versatility of this receiver enables transcelve VFO control with the matching FL-101 transmitter on FT-101E transceiver. New solid state technology, with features such as double-balanced mixer, offers professional performance and rejection of cross-modulation and intermodulation interference. Build your performance base station with the addition of the FR-101D on FR-101D DIGITAL communicatior receiver.

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- Selectivity 2.4 kHz (CW, RTTY, LSB, USB, AM-N)
  600 Hz (CW-N)
  6.0 kHz (AM-W)
  20 kHz (FM)
- Sensitivity 0.3 uV 10 dB S + N/N SSB, CW
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- AGC time constant selectable
- Audio output 2 watts into 4 ohms
- Power 100/110/117/200/220/234V AC 50-60 Hz or 13.5V DC.
- 340 mm x 153 mm x 285 mm

FR-101D	**$723**
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SP-101 Matching Speaker	**$38**

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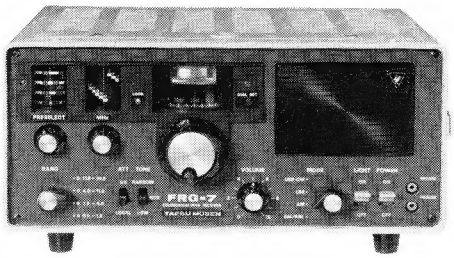

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An Investigation into the Organisation and Management of the Wireless Institute of Australia

At the 1975 Federal Convention the Federal Council approved the appointment of Mr. Bob Arnold VK3ZBB as the Investigator to enquire into and submit a report upon the administrative, financial and constitutional organisation of the whole of the Institute. This was reported on page 28 of AR for June 1975.

Mr. Arnold has now produced his report despite severe pressures of his own duties and has submitted it to the Federal President at no cost whatever to the Institute.

This Report is now printed in full for the information of members. A reminder is given that the Report is advisory and will come before the Federal Council at the 1976 Federal Convention during May.

It is hoped this Report will receive careful consideration by each member and that constructive comments will be sent to the Member's Division as early as possible to enable the Federal Council to deal with it in an informed manner. ■

Due to changed circumstances my enquiries into the affairs of the Wireless Institute of Australia took a different course from that originally envisaged. As it was impossible to visit all States it was considered it would be invidious to hold discussions with a relatively small group of interested persons particularly as these would be concentrated in the southern part of Australia. To give each State equal opportunity it was therefore decided to obtain the opinion of various groups by correspondence. Accordingly, two different questionnaires were prepared. The first was sent to the President of each of the seven Divisions, and it was most disappointing to find that only three Divisions — Queensland, South Australia and Tasmania — forwarded a reply although personal comments of the Secretary of the New South Wales Division were received.

It is hard to understand this lack of interest when —

- The investigation was promoted by Federal Council which is made up of representatives from all Divisions.
- Verbal intimations were that the Divisions were not satisfied with the conduct of the Federal Body.
- An opportunity was available to fully present in confidence, the views of the Division on the future of the Institute, and point out present weaknesses.

The second questionnaire was sent to sixty radio Clubs throughout the Commonwealth, and here again the response was not encouraging as indicated.

	Letters Forwarded		Replies Received	
	O.C.	R.C.	O.C.	R.C.
VK1	—	1	—	—
2	13	5	5	—
3	7	11	1	4
4	11	4	3	—
5	2	2	—	—
6	4	2	—	—
7	—	—	—	—
8	1	—	—	—
9	3	—	—	—

Note:

1. O.C. represents Open Clubs.
2. R.C. represents Restricted Clubs, i.e. affiliated with a College, School or similar organisation.
3. VK9 includes PNG and other territories outside Australia.

Four of the Victorian replies were from Restricted Clubs which could hardly be considered representative of the licensed amateur.

This lack of response has therefore necessitated an impartial view of the whole organisation of the WIA with little recourse to the views of the Members, and the following conclusion and recommendations are submitted —

RECOMMENDATIONS

Many persons associated with the Institute appear to place undue emphasis on its historical significance. Whilst one should be proud of history and historical associations, to survive in today's world an organisation whatever it may be, must be in tune with today's events and philosophies. This is particularly so when related to radio, the growth in science and practice of which has probably exceeded most other industries during the past fifty years.

The amateur radio movement is also closely allied with national and international affairs and must therefore be geared to meet the challenges of modern political thought which has changed completely in the last 30 years not only in Australia but in the total world scene. The Institute's management structure and its policies must therefore be geared to the closing decades of the 20th century so far as events can be predicted.

The structure of the Institute has developed on State lines based on Constitutions drawn up in the 1920s when the international radio industry was in its infancy. The present structure would appear to be cumbersome and possibly unwieldly, and it is therefore suggested that consideration should be given to a gradual reconstitution of the Institute on the following lines:—

1. Re-vitalise the WIA through the Introduction of a new name. Use of the word "Institute" is somewhat Victorian and the adoption of a name such as "The Amateur Radio Association of Australia" would attract more public relations appeal.
2. Re-constitute the Federal body as an entity, the Members of which would be Individual Corporate Members.
3. Wind up the Divisional corporate entities as such, and re-constitute them as metropolitan Clubs affiliated to the Federal body. Further detail on this matter is contained in the main report.
4. Have the sixty or more radio clubs throughout the country affiliated to the Federal body, the Members of each being Members of the Federal body.
5. Devise a scheme of regional representation, whereby Clubs, whilst having direct access to the Federal body, would, through regional representatives, have a spokesman at Federal Conferences, etc. The regional representation system would ensure that each State would be represented.
6. Appoint an appropriate number of directors of the Federal body from the regional representatives. Additional directors if required, could be appointed on an agreed basis, e.g. pro rata to membership, licensees or population.
7. In the light of the above recommendations, review the function of the Federal office. It may be desirable to appoint additional permanent staff with an amateur radio background rather than part-time employees.

In addition to the organisational matters mentioned, the following recommendations are in respect of Federal office operations:—

(a) Set up working parties to examine the legal, administrative and financial implications of introducing trading activities, i.e. the sale of components, kits, imported equipment and publications.

(b) Approach the Postal and Telecommunications Department with a view to obtaining its co-operation to provide a closer link between the WIA and the licensed amateur. Examples of such co-operation could include:—

- Amateurs assisting the policing of legislation.
- The WIA acting as a collecting agency for licence fees.
- The provision of a levy on the licence fee to provide WIA with funds for national and International liaison activities.

(c) Examine the possibilities of decentralising some of the WIA work-load from Melbourne. This would be appropriate if suggestions such as (a) were adopted.

(d) Consider liaison with a magazine publisher to incorporate "Amateur Radio" as a supplement to a commercial magazine. If this is not feasible, concentrate on the publication of one national journal with supplementary regional news rather than the multiplicity of magazines produced by various sections and clubs of the Institute.

(e) Improve communications between WIA and members by widening broadcast facilities and providing broadcast stations with tapes on WIA activities.

(f) Improve communications between WIA, Divisions and Clubs by the issue of news letters from time to time.

(g) Introduce a new approach to the publication of the Call Book, using EDP print out facilities for the publication.

(h) Consider the appointment of additional permanent staff to the Federal Office, preferably through the ranks of radio amateurs and adopt a more formal approach by the Federal office.

(i) Emphasise in every possible way, the importance of the Member and the desirability of securing virtually 100% membership of the licensed amateurs in Australia.

The bases for these recommendations are elaborated in the following examination of activity functions:—

1 PREAMBLE

There is no question that for many years the burden of organising and managing the WIA has fallen on the Victorian Division. Not only does Victoria have to provide a Divisional Council — a common function in all States — but it additionally provides the Federal Executive and an Editorial Board for the production of "Amateur Radio". Thus the available volunteers in Victoria, although keen to further the ideals of the Institute, are widely spread over three fairly distinct functions.

Not only has this created a certain amount of resentment in other States, but it has placed an undue burden on the Victorian Members who are no greater percentage of licensed operators than elsewhere. Without implying any criticism of the excellent work undertaken by these Victorian enthusiasts, it would probably be advantageous to spread the load of WIA affairs across the country where this is feasible.

In the context of recreative Clubs, of which there are an infinite variety, the Wireless Institute and its kindred associations overseas have a certain uniqueness —

- It is a Club, the membership of which seeks to deploy its spare time interests in pursuit of knowledge and social contact between Members.
- It is affiliated with world-wide organisations with whom direct communication can be simultaneously made.
- It is above barriers of race, creed, colour and political allegiance.
- It can, from time to time, provide valuable service to the community.
- Its membership is indirectly a national asset being a nucleus of trained personnel available to serve in the Armed Forces.
- Its membership is trained to an internationally acceptable technical standard.
- Its membership is licensed to undertake its hobby.
- Its membership pursues its hobby in accordance with legislative requirements.
- The local legislation requirements are based on international agreements.

Whilst radio amateurs conduct their operation in accordance with the criteria outlined which may be an advantage or a penalty according to one's philosophy, it is not possible to divorce the radio amateur from the international scene as the basic rules of radio communication are formulated on an international basis. International deliberations may not operate in the best interests of the radio ama-

teur or those of the countries which promote close co-operation with the radio amateur. It is in the interest of all radio amateurs who wish to retain facilities presently granted to them to maintain a solidarity both on the local scene and internationally to ensure that their rights and privileges are maintained in the future.

It has been shown that approximately 50% of amateurs are Members of the WIA. Allowing for a small proportion of inactive licensed amateurs, membership of the Institute should be much higher. It is hard to see why membership of an organisation actively promoting the interests of amateurs, is not more widely supported.

Possibly the reason for this is the lack of communication. Without doubt one of the most surprising features of the Wireless Institute — an organisation comprising Members who have the fullest facilities for communicating — is its lack of communication, and this is probably the most fundamental reason why its membership is not greater and why there is dissention among its membership today.

This report seeks to examine areas of influence within the WIA and to suggest changes which can be made to improve its effectiveness.

To carry out this study, recourse was made to available documents, although these were not comprehensive of the activities of all Divisions and Clubs. The Memorandum and Articles of Association of the Federal body together with one typical Divisional Memorandum & Articles of Association, were studied; letters were circulated to Divisions and to Clubs, requesting information on specific questions and inviting comment.

Limited discussions were held with officers within the organisation and individual Members. This information was allied with that of organisations of a similar nature both in Australia and overseas, and reference was made to the situations obtaining in amateur radio organisations particularly the RSGB and ARRL. The areas of influence are now discussed in detail.

The name of the Association — "The Wireless Institute of Australia" — has virtually been used for over 60 years. The name was obviously coined in an era where this was applicable but today the use of the word "Institute" is somewhat Victorian and hardly in keeping with modern times. Whilst a change in name is not vital, consideration should be given to this aspect to improve the image of the membership, particularly to the general public and to the media.

2 THE CORPORATE STRUCTURE

When compared with most organisations of a similar nature the Institute through its Divisions and Federal body, has an interesting although overburdened corporate structure. The seven Divisions — A.C.T., New South Wales, Queensland, South Australia, Tasmania, Victoria and Western Australia — are autonomous corporate bodies, each registered in its own State according to the appropriate Company legislation.

Whilst a study has not been made of the individual Memoranda and Articles of Association of each Division, it is understood that each is modelled on a common structure with only minor variations to suit local State situations.

For the size of the organisation, the total corporate structure would appear to be most unwieldy and probably unnecessary to conduct the affairs of the Institute.

The corporate structure is historical having been conceived, so far as the Divisions are concerned, in the 1920s. In addition to the Divisions, there are sixty-six affiliated radio Clubs, located in the States as follows:—

Victoria	18	New South Wales	18
Western Australia	6	South Australia	4
Queensland	15	A.C.T.	1
Northern Territory	1	P.N.G., etc.	3

These Clubs are affiliated with the Institute and it is probable there are a further number who do not have such affiliation. From information obtained there is little doubt that the majority of Clubs play a more intimate role in the day to day affairs of the radio amateur and potential amateur than do the majority of Divisions.

Clubs are generally based in a geographical region and give service to their Members within that limited range of territory. It is not surprising therefore, that they are, by and large, active and provide on a regular basis a common meeting ground for those associated with our hobby. An even more complicated structure exists with Divisions and individual Clubs in each State and there appears to be a lack of identification between these two groups. As in many other areas of activity, lack of identity breeds indifference, and a major solution to the problems of the Institute is seen in a reconciliation between Divisions, Clubs and the National body. In general, the Clubs responding to the question on this topic agree with this view.

There is considerable criticism in some areas of Club liaison with the Divisions, but in general terms the work of the Federal office and its financial requirements is understood and has been accepted.

There is some fairly strong comment on the parochialism of the Divisions and it has even been suggested that for the Federal Executive to avoid such criticism, it should set up its office on "OSCAR 7".

The function of the National body is almost essential in this day and age to provide a co-ordinated service to all Members of the Institute. The production of a magazine is, of necessity, a National obligation and it is probable that much energy, time and interest of Members is dissipated in the production of minor journals sponsored by Clubs or groups of individuals. Over the past few years we have seen a number of such publications rise and wane, each being a product of a group of enthusiasts who eventually become disillusioned with the lack of support for their particular line of interest. If these energies, which are not spontaneous, but appear from time to time in various parts of the country, were to be channelled to the National publication, the Institute and its Members would be better served.

The theme of the major recommendation is therefore, one of co-ordination of a diverse range of WIA activities operating in Australia today. To achieve this goal requires a major re-organisation of the Institute. It would be of a revolutionary nature and on the surface may appear unpalatable to many traditionalists, but in due course it would provide a much stronger and more effective organisation. In particular, its strength would be enhanced to meet the ever-growing threat to the ultimate loss of its valued facilities.

This recommendation is that the National body should set up a study group to investigate the report on the legal, financial and practical ways of creating a single corporate entity which can speak for and co-ordinate the National activities of amateur radio.

In simple terms this would mean —

- Disbandonment and liquidation of the corporate bodies known as the Divisions.
- The strengthening of the National body through direct membership of individuals. Individuals who are presently Members of a Divisional body will transfer their membership to a National body. Thus amateurs in Australia would be Members of the Wireless Institute of Australia and not of a State organisation.
- The transfer of affiliations (if existent) of Clubs from the Divisions to the National body to enable Clubs to have direct access to the Federal body.
- The creation of new Clubs to carry out the technical, training and social activities presently undertaken by the Divisional centres in the Capital Cities. These Clubs would then become — Perth Radio Club, Sydney Radio Club, etc.
- Introduce a scheme of regional representation to give individuals and Clubs direct representation at Federal Conferences, etc. The number of regional representatives would be determined —
  (a) To give regional representation.
  (b) To be proportionate to the membership.
  (c) To give each State at least one representative.
- From the regional representatives appoint Directors of the Federal body and at the same time give some discretion to appoint additional Directors where deemed desirable.
- Review the function of the Federal office together with the probable continuance of a Federal executive responsible for the day-to-day administration of the Institute. With the change in function of the Federal office it may be desirable to appoint additional permanent staff rather than part-time employees to give adequate relief to the Secretary/Manager when he is absent from his office and to assist with the expeditious handling of matters referred to the office.

The presentation of this recommendation has not been made lightly as it is realised that apart from the effect of personal feelings there are probably detailed and complicated legal and financial obstacles to be overcome. Not the least of these would be the disposal of the Divisional assets and the transfer or otherwise of these assets to the Members of the Division to whom they truly belong.

The implementation of such a scheme would bring long-term benefits to the membership. There is little doubt that the intimate style of the Club organisation is more attractive to membership than is the central City-type activity which struggles on in the metropolis of each State. In the two larger States, New South Wales and Victoria, the attendance at General Meetings is a very small fraction of the membership. As has been found in many other organisations, decentralisation within the metropolitan area of the State Capitals is the only really satisfactory way of enticing people to leave their homes to attend meetings and functions. Members are generally sensitive to the traumas of travelling relatively long distances to meetings; the creation of suburban Clubs overcomes this problem to a great extent. It also spreads the load of organisation and administration more widely among the membership and lightens the burden of office.

In this context the National organisation becomes the centroid of administration carrying out functions of membership control, account presentation and collection, the preparation of publications or material for circulation, the co-ordination of specialist groups which exist at present, and above all, close liaison with those who administer the Wireless Telegraphy Act and therefore control the destiny of amateur radio.

The scheme proposed should also show some significant financial saving. On average, over 25% of the major subscription rate for 1976 is allocated for Divisional funds. This sum would be reduced significantly, a very small proportion of it being added to the National body's expenses to cater for the additional work required. At the same time a much closer relationship would be created between the central body and the Clubs but this could lead to higher costs particularly in the field of stationery, postage, etc. Nevertheless, the picture may be even more reasonable than would first appear. The co-operation and interest which could be developed between the National body and the Clubs would provide a firm basis for an increase in membership which, in turn, would increase the revenues of the organisation without significantly affecting the outgoings. Thus, Members would be better served in two ways —

(a) by minimising membership dues, and

(b) by more effective operation of the Institute's activities.

However, harmony is an unnatural state for a Federalist system and great care would have to be taken to ensure that a change such as that envisaged would not lead to even greater problems than exist at present.

3 THE FUNCTIONS AND OPERATION OF THE FEDERAL OFFICE

The Memorandum and Articles of Association of the Wireless Institute of Australia indicate that the Company was incorporated on the 17th January, 1972 and that the Members of the Institute are qualified corporations, i.e. Divisions representing radio amateurs in the Commonwealth of Australia. It is not proposed to summarise corporate documents but to mention that the Executive comprises a number of persons who have authority to act for the Institute. The Authorised Officer of the Institute is the Secretary/Manager, whose duties as stated in an advertisement for the post, are — "to act as a Secretary to the Federal Executive and to take responsibility for the administration of the organisation; to act as Manager of the organisation's publications".

The Secretary/Manager is a salaried officer and at this time is assisted by a typiste clerk and a part-time assistant. An additional part-time assistant is responsible for obtaining advertising for "Amateur Radio". The total salaries are budgeted at $23,500 in 1976.

Apart from Members of the Executive it is unlikely that Members of the Institute, including Federal Council Members, appreciate the diverse

operations which are carried out in the Federal office. As with many similar small organisations, it is an "itsy bitsy" operation covering a wide range of duties, few of which in themselves require special skills but which in aggregate, require considerable devotion to duty. Because of this wide range of tasks the total operation is unquestionably hampered due to interruptions, telephone calls, personal callers and the general switching from task to task which is inevitable in an office of this nature.

It is not possible to conduct a detailed Organisation and Methods study of an operation of this kind. It would appear that the systems provided, particularly for membership records and finance, are of adequate sophistication, and therefore the balance of the work has to be conducted in a manner befitting an office with limited facilities.

Similarly, it is not possible to allocate with meaningful accuracy, the time spent by members of the staff on their various tasks. Suffice to say that the staff appear to have their priorities in the right order and appear to conduct their business in an efficient manner, bearing in mind the nature of the work.

Probably the most important segment of the work, at least so far as the membership is concerned, is the accurate maintenance of Members' records, their subscription accounts and the production of mailing labels for "Amateur Radio". If this procedure fails at any point of time or is not updated expeditiously, the individual Member is affected immediately. The maintenance of this system which is based on EDP records, is an important facet in Member relations. It is presently conducted efficiently and must not be permitted to fall below the existing standard.

For most of the other operations of the office it is desirable that the staff should be fully familiar with amateur radio, as it is only a close understanding of the hobby that enables enquiries and correspondence to be dealt with sensibly and expeditiously.

It was surprising to find that no retired radio amateurs were employed part-time in the office. Such people could be invaluable if additional staff were required or replaced.

As previously mentioned, it was not considered a part of this investigation to undertake a detailed study of the day-to-day operations of the Federal office, but it would appear desirable to reinforce the staff with at least one permanent officer, preferably having an amateur radio background, who could deal with correspondence and provide a more comprehensive information service to Divisions, Clubs and Members.

Within the membership it is almost unanimously agreed that the location for the Federal office should be Victoria and that no move should be contemplated. This opinion is soundly based on the fact that legislative administrators have their office in Melbourne. It is essential that the National office of our organisation should be in close liaison with those who control our interests, and any move of the legislative office should be followed by a move of the Institute's Federal office.

Opinions on liaison and co-operation between the Divisions and the Federal office are varied. It is clearly recognised that the 1975 Federal Meeting did much to improve relations, but some Divisions are not satisfied with the situation obtaining at the present time. Criticism has been levelled at the lack of information emanating from the Federal office and the delays in receiving replies to correspondence. It has been suggested that the Federal office should adopt a more formal approach to its business, and this opinion is worthy of close investigation.

An improvement in staffing level would enable more rapid communication to take place and give the Federal office an opportunity to prepare material for circulation among the membership by mail, broadcast or through articles in "Amateur Radio".

4 THE ROLE OF THE MEMBER

The majority of Members of the Institute are licensed amateurs. Associates not falling in this category are generally keen on amateur radio as a hobby and are invariably potential members. Unfortunately, only about 50% of licensed amateurs are Members of the Institute, and allowing for inactive licensees and a small number to whom the subscription is a critical factor, this proportion is disappointingly low.

Without question, those contacted during this study endorsed the necessity of a strong Institute which is able to speak for amateurs as a whole and preserve their rights and privileges.

Numerous reasons for amateurs not being affiliated have been put forward, the least common of which is the cost; the fact that the majority of amateurs are able to purchase quite sophisticated and expensive equipment, endorses this statement.

The most common view expressed is the inferred lack of activity by the Institute. However, it is unlikely that the non Member would have a complete working knowledge of the Institute's activities and in particular what it is doing to assist the Member in diverse ways. There will always be a percentage who are prepared to "free-wheel" and enjoy the benefits obtained by others who support the cause, but there still remains a hard core of licensed amateurs who are potential Members, and it is to these that the advantages of membership must be made known.

It is realised that numerous attempts have been made from time to time to attract these people to membership with minimal results, and it is believed that the only way in which these people can be forced to appreciate the work of the Institute is by some compulsorily-applied levy conditional on the issue of a licence. This may seem hard but it is not unreasonable that such activities as national and international representation could not be fully supported by this means. Imposition of levies is not unusual in Government finance, and the recently-announced fee for the Novice Licence has indicated that the legislature has a power to adjust licence fees from the standard prescribed for the full amateur.

All licensed amateurs are free to use the facilities provided by the Institute by ways of repeaters which are becoming numerous throughout the country and are generally fully utilised. No doubt such facilities are used by non Members. Probably it is feasible to place in the repeater system a brief message which could be transmitted from time to time pointing out that the repeater is a facility provided by the Institute which would welcome into membership those using the facility.

Many amateurs give considerable service to the Institute and to its affiliated activities but there is always a call for greater participation by the membership. By reducing the personnel engaged in the administration of the present Divisions, more Members would be available to participate in Club activities and allied spheres of interest. Such activities as WICEN come to mind as particularly worthy of support as this is an organisation devoted to service in times of emergency — a most valuable community service which is not widely publicised outside the amateur ranks.

In this report a number of suggestions have been made to improve the Institute's operations; it is hoped that at least some of these may entice amateurs to become Members and perhaps, more importantly, overcome obvious prejudices which have been built up over the years against the Institute and some individuals who have served it. Such personal antipathies and interstate jealousies have been frequently mentioned as major barriers to the smooth running of the Institute's affairs. These must be overcome in the interests of the amateur fraternity as a whole.

There has been some criticism on the make up of the Amateur Radio Call Book. It is appreciated that the Call Book is published in conjunction with the PMGs Department and has to contain the name of every licensed amateur in the country. Possibly the EDP system could be so programmed to have every licensee on its roll, a system which would readily facilitate a print out which could be readily transferred into a Call Book. At the same time each Member of the Institute could be asterisked, thus highlighting licensees who are not Members.

The retention of the present Member and the recruitment of potential Members is obviously the most important task of the Institute. Without membership the Institute is nothing, and true effectiveness can only be achieved when membership of the Institute comprises virtually 100% of the licensed amateurs in this country. Great emphasis must, therefore, be paid to the requirements of the individual Member either directly or through the affiliated organisations in which he is interested.

5 COMMUNICATIONS

There have been varied criticism of the lack of communication within the Institute during past years. This is quite a remarkable fact bearing in mind that of all recreative organisations, the Institute has at its fingertips the most popular of communication media — the radio and television. It is probably not opportune to discuss television as a communication media at this time but no doubt its use in disseminating Institute information will develop in the future. Each Division conducts news broadcasts which vary in content and interest. It is suggested that these broadcasts should be reinforced, particularly from the Federal level.

At the present time a modest amount of Federal information is conveyed through these broadcasts but more effective use of this facility could be made if reports of Federal Proceedings and activities were regularly (say monthly) taped and forwarded to each broadcast organisation, the cassettes being circulated if necessary and eventually returned for re-use. Generally speaking, broadcasts are only made on Sunday mornings and possibly repeated later that same day. Much wider coverage would be obtained if broadcasts were repeated during a week day and possibly at a time which would suit many of the shift workers who are unable to listen at the present prescribed times.

In addition to improving the efficiency of news dissemination through broadcasts, recourse should also be made to the regular circulation of newsletters from Federal source, perhaps initially on a quarterly basis, for dissemination by Divisions and Clubs at their regular meetings. By these two means the Federal office would become better known and its activities fully recognised by the membership and many interested persons who are potential Members.

The proposed scheme of Clubs being in direct contact with the Federal office would probably not affect broadcasts as these would still be undertaken by the Metropolitan Clubs or alternatively, a broader spectrum of operators obtained from sharing the activity with Suburban Clubs.

Many comments have been received on the lack of formal public relations conducted by the Institute. It is questionable whether these critics are fully familiar with the problems which face persons or organisations disseminating public information. By and large, the National media is not at all interested in routine events and will only publish information which is related to spectacular happenings, e.g. the Darwin disaster. It would be almost impossible for the Federal body to obtain mileage from the National press particularly as each State has its own newspapers and media outlets. The only reasonable means of getting some coverage via the press is for Clubs to disseminate information to suburban or regional papers which are generally hungry for news with local and personal content. There are numerous excellent examples of this type of publicity.

Public relations is an expensive and time-consuming exercise and unless professionally conducted, is generally unrewarding.

One of the interesting facets of life which has come out of the investigation is the attitude of the amateur himself to communications. Many comments in correspondence have indicated a lack of understanding of various functions of the Institute and yet these have been published from time to time in AR and in Victoria at least, repeated in WIA broadcasts. So many times one speaks to amateurs and hears the comment, "I do not have time to read AR or to listen to the broadcast", but yet these people will talk in monosyllables for an interminable period, wasting many hours, a few minutes of which could be devoted to an understanding for the Institute. Perhaps this is part of our way of life today and most certainly is a difficult problem to overcome.

Even during the time in which this investigation has been conducted, there has been a significant improvement in communications between the Federal body and the amateur. From time to time information has been submitted to the broadcast, and individual Members of Council have made a contribution. Concurrently, editorials and articles have been published in AR which have given much background information on the work of the Executive and in particular, reviewed in detail the top level activities of the Institute and its financial

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Application	SSB-Transmit.	SSB Receive	AM	AM	FM	CW RTTY	CW RTTY
Number of Filter Crystals	5	8	8	8	8	4	8
Bandwidth (6dB down)	2.5 kHz	2.4 kHz	3.75 kHz	5.0 kHz	12.0 kHz	0.5 kHz	0.5 kHz
Passband Ripple	< 1 dB	< 2 dB	< 2 dB	< 2 dB	< 2 dB	< 1 dB	< 0.5 dB
Insertion Loss	< 3 dB	< 3.5 dB	< 3.5 dB	< 3.5 dB	< 3.0 dB	< 5 dB	< 6.5 dB
Input-Output Termination Z_t	500 Ω	500 Ω	500 Ω	500 Ω	1200 Ω	500 Ω	500 Ω
Input-Output Termination C_t	30 pF	30 pF	30 pF	30 pF	30 pF	30 pF	30 pF
Shape Factor	(6:50 dB) 1.7	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.3	(6:40 dB) 2.5 (6:60 dB) 4.4	(6:60 dB) 2.2 (6:80 dB) 4.0
Ultimate Attenuation	> 45 dB	> 100 dB	> 100 dB	> 100 dB	> 90 dB	> 90 dB	> 90 dB
Price	$31.95	$45.45	$48.95	$48.95	$48.95	$34.25	$63.95

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Oscillator crystals 50kHz through 150MHz available to order. Parallel resonant (30pf) to 20MHz, series resonant above 20MHz. Write for quotation to your requirements (include mechanical size and frequency).

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XD-9-03	± 12 kHz	-50 mV/kHz	$24.10

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situation applicable to the year 1975. No doubt arrangements are in hand for a continuance of this informative material; it is essential that this be maintained as it will possibly take several years for it to be fully appreciated by the total membership

To sum up this section — we have the ideal facilities for communication — use them to the fullest extent.

6 FINANCE

Correspondence seeking opinions on the financial position of the Institute has met with a strange response. In some cases it is believed that Members have been adequately informed, but others, even Divisions and Divisional officers complain that requests for financial information have not been met by the Federal office. Perusal of the pages of "Amateur Radio" in the latter part of 1975 indicate a comprehensive review has been given of the Institute's finances. A statement of income and expenditure together with the balance sheet for the 1974 year, has been presented in full and elsewhere readily understandable "pies" have been presented to give a break up of expenditure for both the Institute and "Amateur Radio" magazine.

There is little point in analysing income and expenditure in detail; suffice to say that 60% of income is expended in the production of AR and the Call Book. The cost of administration and special projects accounts for 30%, with meetings and conventions incurring the balance of expenditure.

With ever-increasing costs it is difficult to visualise any reasonable means of reducing expenditure except in relation to the publications, and thoughts on this subject are given under the appropriate heading.

Two areas of expenditure are worthy of closer investigation —

(a) As indicated elsewhere, there is an overwhelming awareness of the need for the Institute to firstly maintain a good relationship with the legislative controllers in Australia, and more particularly, to ensure that adequate representations are made to preserve the existing international facilities enjoyed by radio amateurs. Only 2.8% of expenditure is directed to these two areas and it may well be desirable to increase such representation and expenditure to ensure that the facilities enjoyed by radio amateurs in Australia are not prejudiced.

(b) The second item is the expenditure on "Mag Pubs" which is quoted as 4.1%. Due to the varied nature of administering Mag Pubs it is questionable whether this allocation is accurate and whether the comparable income truly reflects the result of this marketing activity. This subject is commented on elsewhere.

Generally speaking, there would appear to be little opportunity to reduce expenditure at the Federal level except as indicated above and the only reasonable means of reducing Members' contributions is to co-ordinate activities outside the Federal body, i.e. in the Divisions and Clubs. Each Division has its own fee to support its work and the many Members of the Institute who are Members of the affiliated Clubs also pay for the privilege of being in those Clubs, either by direct subscription or by contributions to the many fund-raising efforts conducted by the Clubs. A streamlining of the overall administration by the elimination of one of these cost centres would seem logical and is recommended. Except as indicated, the membership should be satisfied with the way the finances of the Federal body are handled. With AR requiring such a large proportion of the income it is hardly feasible to effect any significant savings; this can only be achieved elsewhere in the organisation.

7 TRADING

There have been a number of suggestions that the Institute should enter the field of general trading, both in magazines and similar publications and in materials and equipment for the use of members.

At the present time Mag Pubs is the only venture of this nature and it is probably one of the most difficult ones to handle. Members have been unduly critical of the efficiency of handling Mag Pubs business and it is obviously not realised how much work is necessary to provide this service. In order to obtain appropriate discounts to justify this work, orders for publications have to be collated and then relayed to the publisher in an overseas country. Not only does the collation take time particularly when waiting for sufficient orders to be received but postal delays between overseas countries are becoming increasingly longer and therefore delivery times become protracted.

Whilst an effort has been made to faithfully record the time and money spent in this operation it is one of many facets and it is difficult to allocate with great accuracy. It is therefore suspected that the cost of operating Mag Pubs is not commensurate with the modest return obtained. It should either be dropped or handed to a voluntary organisation outside Victoria to administer. This, of course, could be done on behalf of the Executive and is at least one small part of the activities which could be decentralised from Melbourne.

Members would not be unduly prejudiced if Mag Pubs disappeared. Lists of overseas' publications could be printed in AR from time to time and the Member directed to order straight from the publisher or through a local book seller.

The advocates of trading in equipment and components are probably unaware of the financial implications involved in such operations particularly where paid staff is required to manage an enterprise without the productivity reward normally associated with the one-man business or small partnership.

The last few years has seen an enormous change in the philosophies of the radio amateur towards equipment. A relatively short time ago the amateur owning commercially-manufactured equipment was almost unknown, most amateurs being satisfied to pursue traditional "home brew" activities, getting both satisfaction from manufacturing and understanding the functions of radio as well as the joys of operating. Today, the incidence of "home brew" on any frequencies under 70 cm is a rarity and a large turnover of commercially-manufactured equipment has been experienced by the small number of component distributors active in Australia.

In this study it has not been possible to ascertain this National turnover nor estimate the capital involved in running these businesses. It must, however, run into several hundred thousand dollars. If the Institute is to enter this field it must consider a number of salient points:—

- The total market for amateur equipment.
- The percentage of this market which could be obtained.
- The dealerships available for imported equipment.
- The amount of capital required to conduct a business.
- The source of funds to operate the business.
- The expenses incurred in running a business, including salaries, interest, premises, general overheads and guarantee funds, particularly bearing in mind the trend to consumerism.
- Discounting policies.
- The reaction of present advertisers in "Amateur Radio" and their contribution to the publication of this journal.

Such matters require the formation of a competent committee of persons, conversant with business and commerce who would be capable of making an accurate economic study of such a proposition. If such a business venture is contemplated it is recommended that no action be taken without such a study.

8 PUBLICATIONS

The WIA is only concerned with the production of two publications for general circulation. These are the monthly magazine "Amateur Radio" and the Amateur Radio Call Book, published from time to time. From all the discussions and comments directed to the newsworthiness and general format of "Amateur Radio" there has been little criticism, and a number of complimentary remarks have been received on the improvements which have been made during the last 12 months. Members consider that news bulletins from the Federal office and memoranda on the work of the Federal Executive is essential although these requests would appear to have been adequately covered in editions published in the latter part of 1975.

There is a common plea for more regional news and a continuance of Divisional or regional bulletins which serve to keep the membership in touch with colleagues in the same geographic region. It is obvious however, that those seeking more local content do not realise that this cannot be manufactured by the editorial staff and it must be clearly pointed out to those who desire this material that it must be fed to the Editor from the Club or region concerned.

There is some move to suggest making "Amateur Radio" available to non Members as a means of promoting membership and perhaps improving the magazine's finances. There has been discussion on this matter in the past and it is presumed the current policy has been well thought out and is under continuous review

The cost of producing "Amateur Radio" with its attendant distribution charges are cause for concern as they will, at least in the foreseeable future, continue to increase at a rapid rate together with other general costs of the Institute. Some of these extra costs can be offset by additional advertising revenue, but it has to be borne in mind that continually increasing advertising charges may inhibit the use of the magazine by trade houses. Three means of overcoming the foreseeable cost problem may be worthy of consideration —

1. Provide more attractive supplements to AR which give local or regional news, and at the same time persuade the publishers of subsidiary magazines such as those published by Clubs to forego their activity and channel their material through AR. This may be a means of improving the circulation of AR and possibly attract additional membership to the Institute. Wider circulation would make the magazine more lucrative to advertisers and thus improve the supporting revenue.
2. A closer association with the radio Clubs may make it feasible to distribute a portion of the circulation of the magazine in bulk, i.e. distribution at Club meetings, provided these were scheduled early in the month to coincide with the magazine publication dates. It would be worthwhile investigating this as a partial method of distribution and the savings which may emanate therefrom.
3. From observations of the technical press it would appear that magazines covering a broad spectrum of radio and electronics have limited viability as they have been obliged to digress into the more popular areas of hi-fi and general electronics. It may be possible to make an arrangement with a magazine publisher whereby AR could be incorporated in a magazine, particularly one which is carrying limited WIA and Club information in its normal content. Certainly the radio amateur would lose a magazine devoted entirely to his interest but on the other hand the costs of production would be lower, circulation would be vastly increased and this would open a new field of potential membership Expensive distribution costs would also be overcome. A Member of the Institute could possibly receive a concessional rate for his copy of the magazine but this should not be subsidised in any way from the Member's subscription to the Institute. By adopting this suggestion the Member's subscription would be substantially reduced and the Member would feel he was getting more for his money — an often repeated requirement of membership — or at least receive his present services at lower cost.

It is presumably the Institute's objective to publish the Amateur Radio Call Book on an annual basis but in recent years this has not been achieved due to the magnitude of the task. A brief reference to the Call Book has been made in the Membership segment indicating that it may be possible to set up an EDP system which has the name and address of every licence holder available for print out. Members of the Institute would be suitably annotated.

A more detailed investigation into the production of the Call Book would be an interesting venture for a group conversant with EDP, and it is suggested that a Call Book could be formed from reproduced copies of the computer print out issued to the membership in loose-leaf form. By this means, the Call Book could be regularly updated on say, a Call Sign area basis which, allowing for the smaller Call areas, would probably permit a complete revision every 12 or 18 months. The other written material together with advertising contained in the present Call Book, could be produced in similar format but only issued at much longer intervals unless a sponsor required his advertising to be updated.

9 NATIONAL AND INTERNATIONAL RELATIONSHIPS

It would appear that the Institute, mainly through the efforts of the Federal body and Divisions, is held in high esteem by those responsible for administering legislation in Australia.

It is unusual to find an amateur organisation controlled by legislation, and even more difficult for the entrepreneur amateur to accept restrictions on his activities. However, this has been achieved over many years and a state of co-operation and mutual trust exists between the parties. It is worthy of consideration to seek closer bonds with legislative officers, not only to present the Institute's viewpoint to the legislature but possibly to assist in increasing the membership of the Institute which is financing liaison activities.

By introducing a novice radio licence at a modest fee it has been demonstrated that licence financing is not necessarily tied to similar licences issued to commercial bodies, and it may be possible to incorporate in the licence fee some small increment of money which could be passed back to the Institute in order to finance national and international representation. In return for this concession the Institute could offer a number of services to the legislature particularly in the field of policing regulations concerning the issue of licences and the control of unauthorised radio activities. Examples of such co-operation are seen in Japan where the amateur authority acts as a regulatory body in surveying and registering amateur equipment and it is in this similar area that amateurs, authorised through the Institute, could make a contribution towards more rigorous control of radio Communications in the non commercial field. The WIA could also consider acting as a collecting agency for licence fees.

The past few years have seen significant advances in the development of international representation by the creation of a Region 3 Committee on which the Institute is represented. Most amateur bodies recognise the absolute need for this representation because without it the amateur may suffer loss of privileges. In this atmosphere he is entitled to even greater representation to ensure that amateurs' rights are preserved at the next international radio conference, thus strengthening the case for the continuation and perhaps extension of the present amateur facilities.

International representation is expensive and again, it may be possible to obtain via the licence fee, a grant towards expenses so incurred. Alternatively, representations could be made in Government circles for a representative of the WIA to be accredited by the Government and subsidised when attending conferences which are complementary to international meetings which will be attended by an official Australian delegation.

10 CONCLUSION

Although a number of practical considerations have been outlined in this report it has been realised that during the period of this study, the Federal Executive has made a competent appraisal of the problems within the Institute and has done much to improve its information service to the membership. If some of the matters mentioned have already been considered it is due to Federal Executive taking appropriate action, and in this regard the Executive should be congratulated and not criticised by the membership. It is hoped that other proposals may be worthy of further consideration. ■

COMMERCIAL KINKS

Ron Fisher, VK3OM
3 Fairview Ave.,
Glen Waverley, 3150

After a short recess, Commercial Kinks is back in action. I find that summer activities keep me rather busy so amateur radio has had to take second place.

It is quite a while since a popular communications receiver was covered in this column. Our discussion of the Trio 9R59 series continued over several issues and created quite a deal of interest. Over the last year or two, the Realistic DX 150/160 series has undoubtedly become the biggest selling low priced communications receiver on the Australian market.

Firstly we will take a look at the various models and see how they differ. It is also interesting to note that contrary to normal trends the price of these receivers has dropped since they were first introduced. The present retail price is $179.95. Looking back through the advertisements in this magazine, it appears that the original DX 150 was introduced about October 1969 at a price of $229.50. The appearance of the original DX 150 and the latest DX 160 is identical and the features of the sets are basically unchanged. However, the circuit and the frequency coverage have changed.

All models have a full transistor circuit with built in AC power supply plus provision to operate from a 12 volt DC source. Single conversion with a 455 kHz IF is employed with two transistors in a cascode RF stage feeding the mixer. A product detector, fast and slow AGC, and a noise limiter are provided along with calibrated band spread for all amateur bands from 80 to 10 metres.

Now for the circuit differences. The original DX 150 used all bipolar transistors in its design. The DX 150a used FETs in the RF, oscillator and mixer stages and also incorporated a ceramic filter in the IF stage to improve skirt selectivity. It also included a built-in speaker. The outcome of all this was an improvement in strong signal handling and better AGC action.

The DX 150b was essentially the same, but an external speaker, the SP 150, was supplied in place of the previous built-in unit.

The DX 160 differed in two main points. First it included one extra band covering from 150 kHz to 400 kHz. This enables reception of aircraft beacons and airport control towers. The main circuit difference is the inclusion of a single IC in place of the four transistors previously used in the audio driver and output stages. An FET has also been substituted for the bipolar transistor BFO and the buffer stage employed in the earlier models has been eliminated.

Now for a few hints on using these sets and also a few simple modifications.

In general all of these receivers work best on a short antenna. Although the later models with FET front ends had improved strong signal capability they could still produce severe cross modulation if a long antenna was connected. I have found that about 6 metres of wire is quite enough, or if you wish to use a "long" wire then a 3/30 pf trimmer in series with the lead-in right at the antenna terminal should be employed to reduce the effect on the lower frequencies where the cross modulation is more pronounced due to strong broadcast stations.

The second problem common with all models is the extreme sensitivity of the S meter. It will read S9 plus on signals that should only be S1. In fact when tuning across the various bands the meter seldom drops below full scale. The solution. Put in an S meter sensitivity control. A small 10 Kohm pre-set potentiometer of the type used on printed circuit boards is used. Remove one of the wires from the back of the S meter. It does not matter which one. Solder the two fixed contact lugs of the potentiometer, one to each of the meter terminals. Now solder the wire that was previously removed from the meter to the lug of the potentiometer connected to the moving arm. Tune the receiver to a strong broadcast station and set the pot so that the meter reads full scale.

The third problem occurs only with the DX 160.

It appears that the audio IC has too much gain which produces a very high residual noise level. This is most annoying when trying to listen at low audio levels on the speaker or when using headphones. Although there may be other methods, the one I have found effective is to increase the inverse feedback and so reduce the overall gain of the device. This modification incidentally has no adverse effect on the maximum audio output or on the amount of useable gain of the receiver.

Locate resistor R53, a 4.7 Kohm, on the printed circuit board near the left hand rear corner of the set. Now invert the set and solder a 470 ohm ¼ watt resistor across R53 on the under side of the board. This should reduce the noise to a very low level.

If you are on the look out for more information on these sets, I suggest you refer to QST for March 1968 for a review on the DX 150 and to QST for September 1970 for a review of the DX 150A. ■

QSP

THE YAGI BEAM

T.T. by G3VA in Radio Communication for March '76 mentions an important event almost completely ignored by the media — the passing at the age of 89 of Hidetsugu Yagi one of the great pioneers of aerials and microwave communications. G3VA tells us that Yagi's original work was carried out from about 1919 to 1927 but the results of his work did not appear for another 20 years or so.

1975 J.O.T.A.

In his report on the 18th J.O.T.A. in October '75 the National Organiser, Noel Lynch VK4ZNI mentions that a group of 16 Queensland Rovers and Scouters touring Europe after the July Jambouree in Norway had called at the World Bureau Station and spent all day Saturday and all day Sunday trying to get a VK contact. A number of VK stations were heard on the Saturday morning at good signal strengths but no contacts could be made because the stations were engaged in long QSOs and no breaks were made for Dx stations. No VKs or ZLs were heard subsequently at all. The comment was made that it was very frustrating to have an opening through to Australia for 30 minutes or more during that period of poor propagation conditions without being able to break in for even a short contact. In his report VK4ZNI showed from statistics that 333 VK amateur stations were involved (slightly fewer probably than in the previous year) but the total contacts were well up. ■

A LINEAR POWER AMPLIFIER FOR AUSTRALIAN CONDITIONS

PART ONE

R. A. J. REYNOLDS, VK3AAR

Home brewing is becoming a lost art amongst the majority of Amateurs. This is not at all surprising, as the benefits of mass production have been extended to the area of Amateur Equipment, and the cost benefits of home brewing have been considerably eroded. However, modern commercial considerations have robbed the Amateur of the component supplies that he would like to home brew; recent developments at the Commercial level have yielded particular components that would greatly improve a home brew but are simply not available, and Commercial construction methods produce an article which is compact, attractive, and generally effective in operations.

There is little to encourage the Amateur to construct his own 160 through 10 Transceiver, or 2 metre SSB Kiddie phone. However there are many areas of Amateur endeavour that still inspire home brewing. The novel, the simple, the unavailable, and the financially unattractive items for example have many Amateurs reaching for the screwdriver and soldering iron.

How often do we hear the expression, "Yaesu FT101B through a home brew linear to a TH3 beam at 12 metres?" It would appear that more Amateurs turn their hand to building linears than any other major item.

THEORETICAL ASPECTS

The linear is a single stage device involving only a couple of dozen components, there are no critical adjustments, and there are considerable financial gains to be obtained, particularly if there is a junk box and a local surplus store that may be referred to for normally pricey items.

Over the years plenty of designs and construction descriptions have appeared for linear amplifiers for SSB service for varying numbers of bands and varying parts of the RF Spectrum. Probably the most popular linear configuration is the 80 through 10 grounded grid amplifier. But that is where the similarity ends. Depending on the design criteria there is a wild assortment of tube types, power supplies, efficiency targets, drive arrangements, to say nothing of size and shape.

It is an Engineering Fact that, given a set of design parameters, a number of designers will come up with the same number of different designs, controlled by their personal likes and dislikes. Hence the variations that we see in the published designs of linears. Thus, one designer's use of sweep tubes may be controlled by the desire to keep voltages low, whilst another's choice of tube may be controlled by a requirement of maximum circuit efficiency. However, the basic design steps are the same, once the overall requirements are stated.

Most linear amplifiers in the 10 to 80 metre configuration that are built in this country are based on the general designs that have been so regularly published in the USA. They fall into categories controlled by the type of tube used, and the power rating. The tube types are the sweep tube, usually 4 tubes in parallel, of the type designed for the horizontal sweep output stage of television sets; the Transmitting tube type where tubes were actually designed for good linearity in SSB amplifier service, and the "available tube" type, where the tubes chosen are available at low cost from surplus sources. Most designs are around the 1 kW or 2 kW PEP input target and attempt to extract the highest efficiency, even at the expense of linearity in some cases.

Under the regulations in force in this country, the design parameters are somewhat different. Our rules say — *A3A or A3J emission, the peak envelope power of the Radio Frequency output, measured at the input to the antenna transmission line, shall not exceed 400 watts* — The rules then go on to define that the measurement method shall be by doubling the power measured when a two tone output is run into a matching resistive load under maximum linear transmitter output conditions. No reference to maximum input power, no reference to tube power capability, no reference to degree of linearity, no reference to average RF power output under speech conditions and no reference to effective radiated power from the Antenna.

A general result of this is that we are permitted to use as much power as we like to produce a clean 400 PEP output. There are two significant design parameters that result from this state of matters.

1. There is no necessity to specify a high efficiency, and hence high cost output tuning unit.
2. The grounded grid amplifier, which transfers some of the input driving power to the output, giving a higher overall output for a given DC input power to the anodes, loses some of its attraction.

With a couple of assumptions, we are now in a position to write down all of the requirements of a linear amplifier for 80 through 10 metres for SSB service under the rules in force in Australia, assuming that we wish to obtain the legal limit. The biggest assumption that will be made is that most operators wish to use an exciter of the Collins KWM2 type, the unit that has inspired so many manufacturers in the 20 or so years since its first release. A second assumption will be that a nominally 50 to 70 ohm resistive output feed is required. Operators who wish to run open line will more than likely be considering an outboard ATU and may, within the rules, measure their power at the open wire line in any case. So, while we may consider variations to the fine details, the following is the general specification for a linear amplifier as outlined above.

Frequency coverage: 3.5 to 29.7 MHz covering at least the Amateur bands within the spectrum.

Excitation Power: Up to 100 watts PEP.

Output Power: 400 watts PEP in each of the Amateur Bands, as measured by the approved method.

Input impedance: 25 to 100 ohms resistive and within 2:1 SWR against 50 ohms if reactive.

Output impedance: As for the input.

Intermodulation products: As low as possible, say —30 dB.

Power Supply: 240 Volts ± 10% 50 Hz Single phase.

Complexity: The design to be kept as simple as possible.

Service of operation: Single Side Band, with or without RF speech processing.

Cost: To be kept low, but not at the expense of good design, convenience, or safety.

And before we go any further, *safety*. This subject has been mentioned many times in the discussion of linear amplifiers of this kind, but another mention is not out of place. The type of amplifier that we will be discussing will require a power supply at a potential of 1000 to 4000 volts with a steady state output current of amperes for a few seconds. Personal contact with the output of such a supply is almost certain to be lethal. You might be lucky and live through such an experience, but whilst I have heard of deaths from exposure to linear supplies in this voltage area, I have not heard of one survival. Higher voltages have been known to throw victims clear, usually with burns and physical injury, and a good many of us have been unfortunate enough to get across 600 volts or so, yet this class of potential that we will be considering is very final, and we will be considering more than care; we will be considering special precautions to avoid the possibility of contact with the high tension. QSOs might be possible with operators in an after life, but QSLs are impossible.

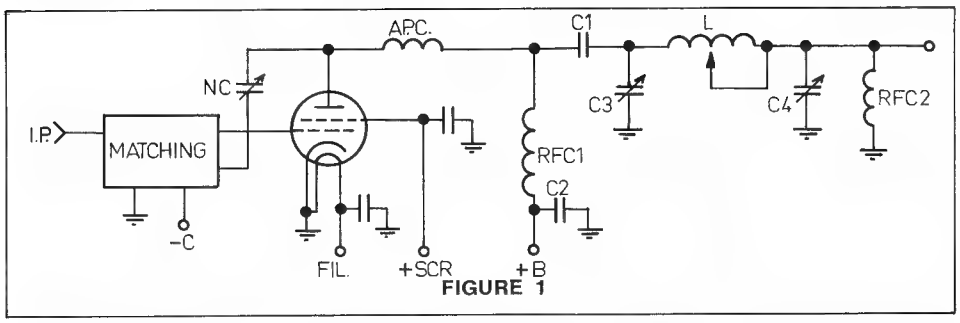


FIGURE 1

Jokes aside, we must all take a responsible attitude towards the handling of the high potentials present in this type of equipment. It is a rather good idea to have somebody with technical ability present when you first test such a supply. Never be too proud to call for aid, double checking is well worth the effort, and that helper may well own a safer EHT probe. During the construction part of this text, which will follow in a later issue, as I have already indicated, we will be discussing the fine details of insulation and component ratings.

Virtually all linear amplifiers used in the amateur service for SSB are single-ended using a Pi-coupler in the output. I have not attempted to consider other systems for this discussion, as the configuration as above appears at first glance to be considerably simpler than its nearest rival, and since this simple arrangement does give a satisfactory result, there seems little point in searching further.

At this point in the discussion, one or two general principles must be considered, and these principles are rather interdependent. So while it may appear to be a little out of place in the discussion, we will consider the type of tube that we might use.

The plate efficiency of most linear amplifiers is about 45%, and since the output coupling efficiency is going to be about 80% and a speech processed voice waveform about 50% duty cycle, it can be deduced that the anode dissipation in the final will be about 300 watts in a continuous duty mode. While some of us may have 'overs' lasting for hours, the ragchew voice waveform duty cycle tends to be somewhat lower. The general result is that we are looking for a total anode dissipation capability of something less than 300 watts. The question may be asked as to how much less. Since the tubes that individuals may wish to use are designed for varying classes of operation, there can be no general rule. Some tubes can take very high powers for a few seconds, or even minutes if they have heavy anodes with a high heat capacity, whilst others with light anodes can take little more over a period of a couple of minutes than they can in continuous duty.

The question of cathode capability also comes into the picture. Tube manufacturers do not design any more power into their cathodes than they need, and the power that can be extracted from a tube in a linear is rather closely tied to the filament or cathode power. It is interesting to note that there are moves within the USA to limit the size of output amplifiers by placing a limit on the size of the heater! Whether the cathode is directly or indirectly heated also has a large bearing on the subject (ref. 'Ham Radio' June 1975, p.4). Whilst not much more than a guess, about 75 watts filament power for directly heated cathodes and about 25 watts in the indirectly heated case are going to be required. But don't the usual run of sweep tubes need about 70 watts or so to raise 400 W PEP?

Yes, but they need that sort of power for the TV service for which they were designed. In linear service they are run at a lower cathode utilization than can be extracted from tubes designed for RF service. So we get down to tube types and their comparison.

Fortunately, many constructors have done a good deal of the work for us and we only have to look at the published designs to establish a first guess as to what tube we want. But before we do it might be possible to ease the job by ruling out a number of the tubes that have been considered previously. While almost any tube could be used in our application, a tube that a manufacturer has designed expressly for linear service has one advantage as far as we are concerned. To find out the voltage, current, and drive requirements we need only look up the manufacturer's specification sheet. In this way we can design directly to ICAS conditions, or if we wish to be a bit conservative, we can use the published CCS conditions.

We should rule out the family of sweep tubes immediately, as well as the older style of RF tube designed for class C service. These tubes may of course be used to good effect, but there are problems which we could do well without. For example, some tetrodes exhibit what is known as Barkhausen oscillation, due to a negative plate characteristic, rather more than we would like. We have already stated that we wish to operate at close to 30 MHz, so there is little point in considering tubes that require additional cooling, or to be run at reduced ratings, at higher frequencies. There is no need to choose a tube or tubes that can produce more power than we need. In addition, if we can do away with a couple of power supplies and noisy blowers, we would be moving a little more towards the simplicity requirement.

On the other hand it is quite likely that down in that junk box there are a couple of tubes that you have been saving for that 'home brew linear' that would not appear to be ideal. Of course you do not throw them away, for while they may not be ideal, may not deliver full power on 10, or may have to be run with more standing current than an ideal tube, they will give good service. But even 'disposals' 813s cost a lot of money these days, and are not much cheaper than a nice 4CX250 or 3-500Z. Now and again some of these latter tubes turn up in the surplus area, and quite usually at bargain prices. The newer tubes have yet another advantage. Their operating frequencies are rather higher than the wartime bottles. 813s and the like start to fold up at 30 to 60 MHz whilst the newer linear tubes, and particularly the smaller ones, run out to several hundreds of MHz.

There are several families of tubes that are well worth consideration. Perhaps the most popular would be the glass giant 5-pin tetrodes in the 4-125A class. These are available in anode dissipation ratings from 65 watts to over 1 kW. However, a word of warning. The 4-65A is not suitable for triode connection grounded grid service, as the internal structure leads to premature grid failure. Another tetrode family, the 4CX250 series will cover an even greater power range in a compact package, either in the force blown form or in the form that is gaining popularity, the conduction cooled version. Newer releases, like the 8873 series appear to be variants. (No pun intended!) In pure triodes, the 3-500Z series would appear to be the obvious choice. According to the manufacturer, these tubes come under various names, and some of the alternatives are of some interest. A particular one is the QB3/300, a European version of the American 6155, itself a version of the 4-125A.

This tube, which is used in the linear to be described later, has several features which recommend it particularly to our broad specification.

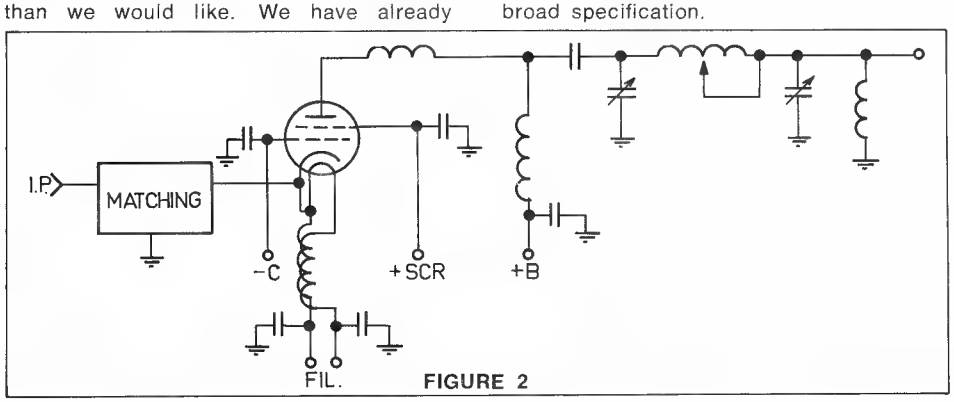


FIGURE 2

The tube is useable to 200 MHz, the anode self capacity is low enough not to cause serious problems, it is compact, and under grounded grid, grounded screen, and zero bias, two tubes draw about 10 mA each to operate well in Class B, and deliver the required power over the 80-10 metre bands.

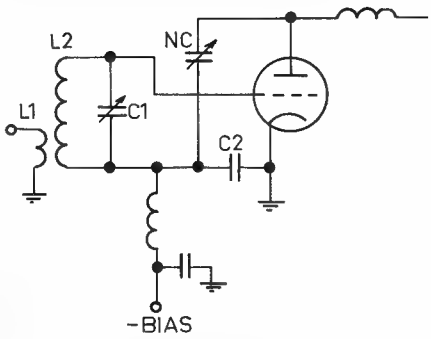
A feature of this tube is that the filament dissipation is a mere 32 watts per tube, and it is not necessary to force cool the filament pin seals as it is in all the larger tubes. However you would not normally go out to buy a pair of these tubes, as a single 4-250A or 4-400A, whilst it needs force cooling, is about the same price as a single QB3/300, or 4-125A for that matter. Both the QB3/300 and the 4-125A have appeared in small quantities from surplus sources in this country. As another hint, considerable quantities of these tubes are used in both broadcasting and television service.

Manufacturers and technical writers often give the intermodulation performance of individual tubes as a measure of their linearity. These figures are of great importance in the design of TV power amplifiers and their use in audio SSB service will indicate the stage linearity at the stated drive and power levels. In general, tubes under hard drive conditions will have poorer linearity than the same tubes treated a little more gently. A 6146 driven hard at a high plate voltage will give an intermod figure of —19 dB whilst at a moderate plate voltage, and of course lower power output, will give a figure of —23 dB or so.

Tubes designed for linear service tend to demonstrate low figures also. Consider the 6146B (YL1370) under the hard driven high output case above: whereas the 'class C' 6146 gave —19 dB, the 'linear' 6146B will give the considerably improved figure of about —26 dB. Tubes primarily developed for linear service, rather than a modification as in the case of the 6146B, may demonstrate intermod figures better than —30 dB. In general, the more negative this number, the better.

At this stage we are beginning to get an idea of what the linear is going to need in the way of power, roughly what size it is going to be, and approximately, how the unit is going to perform. But as yet, we do not know what the circuit is going to be, although we may well have an accurate guess, what the required drive power will be, or what the component sizes will be. Unfortunately, it will not be possible in these pages to cover every possibility of design. Most designs will be controlled by what components are available from the junk box, or what can be obtained from a friend who knows a friend. So what will follow now will be rather a generalisation quoting particular examples where appropriate.

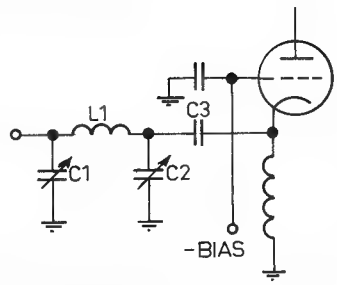
There are two basic circuits that we might use, the driven grid, Fig. 1, or the more popular driven cathode, or grounded grid Fig. 2. Each of these circuits has its advantages. In the case of Fig. 1 the required drive power is very low, but the matching circuit must be switched for each band and neutralisation must be provided in the majority of cases. Fig. 2 requires a higher driving power, most of which appears in the output, but does not require neutralisation when well designed, and the matching unit is less critical than the matching unit of Fig. 1. In USA, where the input power to the anode is controlled by regulation, it is an advantage to have the drive power transfer of the circuit of Fig. 2.



GRID DRIVE INPUT MATCHING WITH NEUTRALIZATION

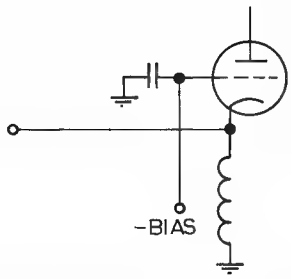
FIGURE 3

First things first, we shall consider the input matching circuit. One of our technical specifications was that the input impedance should be around 2:1 against 50 ohms, that is 25 to 100 ohms if purely resistive. Unfortunately, the tube inputs are rarely within this range and an impedance matching network is required. Fig. 3 shows a typical circuit for a driven grid amplifier with neutralisation. The circuit L2 and C1 are resonant at the operating frequency, the impedance ratio being controlled by the square of the turns ratio L2 to L1. Neutralisation is accomplished in the usual manner by means of the feedback divider NC and C2. The circuit is complicated and from the home brew point of view represents work that we would prefer to do without. On the other hand, if you wish to drive the legal limit from an Argonaut or similar exciter, you will need this configuration to obtain the sensitivity required. Individual networks would be required for each band, but with any luck, it may not be necessary to retune the drive circuit within a band. A linear built for monoband use would not need switching, and this circuit is not unattractive. The impedance ratio required for this circuit is quite high as most grid circuits operating in class AB or B have impedances in the thousands of ohms area.



GROUNDED GRID INPUT MATCHING

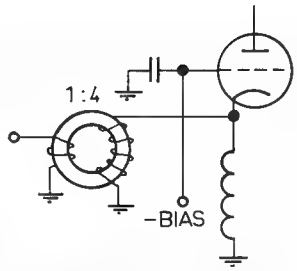
FIGURE 4



GROUNDED GRID INPUT WITH NO MATCHING

FIGURE 5

Fig. 2 shows a typical Pi coupler input circuit for a grounded grid amplifier. The impedance looking into the cathode of such a circuit will be up to 500 ohms for some smaller tubes and down to about 100 ohms for the largest tubes that we are likely to use. The general design of Pi couplers will be covered in the section concerned with the output of the amplifier. Again, switching will be required for each band. In this circuit C3 is a DC blocking condenser and as there may be a blocking condenser in the exciter, C3 may in some conditions be omitted. If this is done and directly heated filaments are used, make sure that the input is hard connected to the earthy side of the filament circuit. For centre earthed filament circuits, we have little option but to incorporate C3. The reason for this precaution is to save the filament choke in the event of an accidental short on the input circuit. If we use tubes like the 4-1000A, the input impedance will be about 100 ohms, no additional matching will be required, and the circuit of Fig. 5 may be used with, of course, the



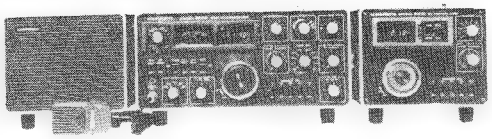
GROUNDED GRID INPUT WITH TRANSFORMER MATCHING

FIGURE 6

VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM

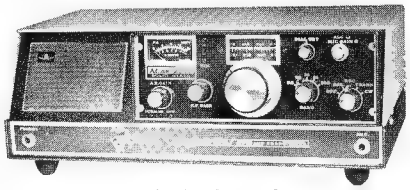
HF TRANSCEIVERS

uniden "... the best value."



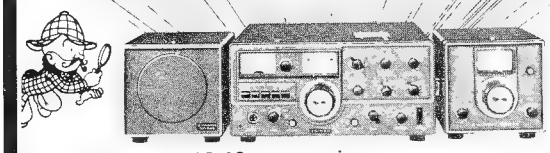
The Uniden 2020 features phase locked loop circuitary for optimum stability, separate usb/lsb/cw 8-pole crystal filters as standard and 6146B's in the final with screen voltage stabilisation for minimum distortion products and a very clean output signal. The rig is produced by the Uniden Corporation who are well known in the commercial and CB markets and manufacture over 45,000 transceivers per month! This rig features maximum accessibility to plug in PCB modules and even the front panel can be swung out for easy servicing. A full spares catalogue is available together with change-over PCB's. Compare the Uniden 2020 with other HF transceivers and you'll be quickly convinced that it offers the best value! The price $570 includes mic, cables, plugs, English manual and VICOM 90 day warranty.

Uniden 2020 80-11m transceiver, complete $570
Uniden external PLL VFO $115



Atlas 210 x 80-10m solit-state mobile including noise blanker $695
Atlas AR-230 AC power supply $165
Atlas Delux mobile mount (DMK) ..... $ 55

TS-520 SERIES



Kenwood TS-520 80-10m transceiver $598
Kenwood TS-900 — out of production
Yaesu FT101E 160-10m transceiver, complete $670
Yaesu FL2100B linear amplifier $430
Yaesu FT75B mobile transceiver $280
— FP75B AC power supply ..... $ 70
— DC75B DC power supply ..... $ 75

TRANSVERTERS

QUALITY QM70 TRANSVERTERS

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CHIM SK406	$12.20
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6BQ6 TUBES $1.50 each

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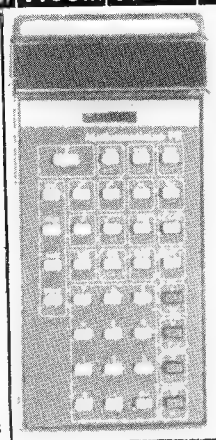
Linear IC Book	$3.40
Memory IC Data Book	$3.40
CMOS IC Book	$4.55
Interface IC Book	$3.40

Novus 4510/4515



NOVUS PROGRAMMABLE MATHEMATICIAN 4515. The addition of learn-made programming to the already powerful Novus Mathematician creates a truly innovative combination of calculating power and convenience. The 4515's capabilities mean that you can virtually eliminate the possibility of errors in performing repetitious calculations. Features 100 separate steps, multi-program storage, skip, facility to de-bug as the program is written. Comes complete with nicads and charger and attractive vinyl carrying case. Price $99.95 incl. tax. **$99.95**

NOVUS MATHEMATICIAN 4510. Electronic slide rule performance you never thought you'd get for the price! Features trig, log functions, three-level stack plus separate accumulating memory, full floating decimal, pi, sq root etc etc. The Novus 4510 has the features and performances of machines costing up to three times as much. Price $39.95 incl. tax. **$39.95**

NEW VICOM WATER-OPERATED TOWER

Although not new, the principle of a hydraulic extendable mast offers several advantages over currently available winch operated models.

1. No sudden and rapid descent if cables break. Loss of water pressure or unlikely failure of non-return valve only results in slow descent of top mast section with antenna.
2. Slim aesthetic design will please the XYL, neighbours and local councils.
3. Safety first, even if small children find water release tap.

How it works. Mast is supported by hinge 10 feet above on a 6 inch diam pipe. Tilt-over action is similar to existing designs. The top section is raised simi[illegible] to the principle used in a hydraulic jack. Simply connect your garden hose to the n[illegible] return valve, turn on the tap and the top section lifts into position. Three high tensile guys are automatically tensioned when the mast is at full height so that the complete structure has great rigidity. The self guying principle is similar to that used in a yacht mast. Guys are fastened at the top, 18" spreaders are welded near the top of the lower mast and guys are anchored near the bottom. The mast can be raised with water pressures as low as 30 psi and even with this pressure over 550 lb can be lifted. Normal pressure in most suburban areas is likely to be around 70 psi. Lowering of the mast is accomplished by opening a small valve at the base and the few gallons of water can be used for the petunias! Height of the tower is 40 feet fully extended, 22 feet when retracted. Finish natural or aluminium paint. Price $575 fob. Auburn, Vic including computations. Freight and installation extra.

LINEARS

QM70 Linear Amplifier for 2 metres. Approx. 10 watts in gives 50 watts rms output. Voltage requirements 13.8V dc. Price $105. QM70 70 cm Linear runs a max of 40w RF output using a 2C39A tube. Requires 300V-1000V HT plus 5V ac. Price $70.

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A new board which contains a buffered 10MHz crystal oscillator with gated output, 8 decade frequency counter divider chain and two additional series connected flip-flops. Nine simultaneous frequencies available; 10MHz 1MHz, 100kHz, 10kHz, 1kHz, 100Hz, 100Hz, 10Hz, 1Hz and 0.1Hz. Price $31 incl. sales tax.

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Our Melbourne store now sells a wide range of components for the keen home brewer. A large stock of bargain resisters, capacitors, ICs, transistors and pcb kits together with plugs and cables especially selected for the amateur are now available.

2M RINGO RANGER ARX-2

The new Ringo Ranger ARX-2 2m omnidirectional offers 6dB gain over a ¼ wave whip. Features 3 half waves in phase and a 1/8 wave matching stub with an extremely low angle of radiation for better signal coverage. Tunable over a broad frequency range and per[illegible]ly matched to 52 ohm coax .$35
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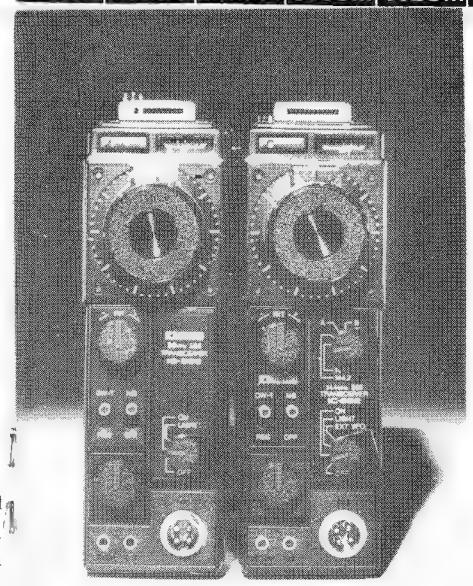


IC502 IC202

ICOM . . . . . where quality counts!

OFFER CONTINUES. Each month (until June 1976). VICOM will refund the purchase price of a quality IC202 or IC502 transceiver to one lucky customer who has purchased one of these rigs during the month!

IC202 – 2 metre portable – $210.

SSB/CW 3 watts with VXO operation. Provision for external antenna and power supply.

Comes complete with mic, carry-strap and dry cells together with –

* English manual ✓
* 12 month warranty ✓
* Factory backed spare parts. ✓

ICOM

IC502 – 6 metre portable – $219.

Covers 52-54 MHz this fabulous portable runs both SSB and CW at 3 watts. Includes noise blanker, RIT control, UFO control and provision for external antenna and power. Comes complete with mic, carry-strap dry cells and of course, the VICOM 12 months warranty.

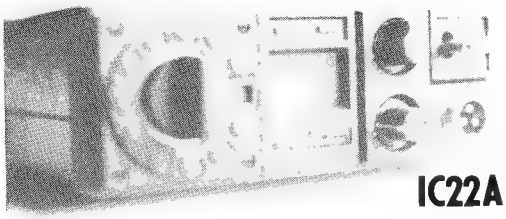
ACCESSORIES FOR THE PORTABLES

IC20L Linear Amp for 2m – 3 watts in/10 watts out. SSB/CW. Plugs into IC3PS power supply – $85.

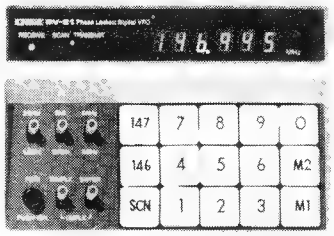
IC50L Linear Amp for 6m – 3 watts in/10 watts out. SSB/CW. Plugs into IC3PS power supply – $85.

IC3PS The matching power supply for the IC202/502 – $75.

The superb IC22A is Australia's biggest 2m fm seller. Perhaps it's due to the solid-state T/R relay, P.A. protection, 5 helical resonators and the proven trouble-free performance. Then again, the great intermod attenuation in the receiver front end together with excellent sensitivity (4 microvolts for 20dB quieting) must have won a lot of hearts! Maybe the VICOM pre-delivery checkout, the after sales service and the factory-supplied spare parts has helped. Certainly strict quality control including rigid environmental tests on all rigs has enhanced the IC22A's reliability and its success in the World Amateur Market. Why not take part in this success story? All rigs come complete with mic, brackets, cables, English manual, 6 channels from the Bandplan and the VICOM 12 month warranty. Price $219 including sales tax.



IC22A

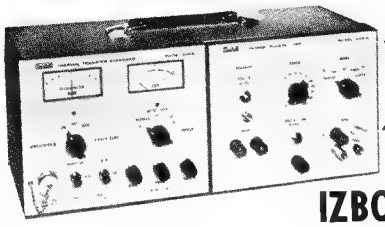


The DV21 PLL Digital VFO is a unique synthesiser to complete your ICOM 2m station (it can be interfaced with other rigs too!). Runs from either 13.8VDC or 240VAC and can scan either empty frequencies or those being used. In addition, two programmable memories for favourite channels can be selected. This sophisticated device incorporates 53 ICs, 34 transistors, 37 diodes and 1 FET and covers the 146-148 MHz in 5 or 10 KHz steps. The DV21 plugs straight into the IC21A or with a simple mod into the accessory socket on the IC22A. The price of $285 includes 90 day warranty, English manual and spares support.

IC[illegible] 2m fm 3 watt portable

Coming off the ICOM production line towards the end of this month is the brand-new IC215 fm portable. Identical in size and appearance to the popular IC202/502 portables the rig runs 3 watts output and has all the successful features incorporated in the receiver of the IC22A (xtals are interchangeable, too!). The price will be $160 including 6 channels, mic, carry-strap, dry cells and 12 month warranty.

This just-released devise will cause a revolution to traditional cw operation. Simply talk into the mic, set the controls and out comes perfect CW at the speed of your choice! CW in any three languages can be selected at the flick of a switch (Japanese, English and Spanish) and the IZBOX has been designed to handle the most complex of Australian lingo. This April 1st special sells for a mere $21,620.



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The TS-700A

Introducing the new Trio-Kenwood TS700A 2m transceiver. It covers SSB/FM/AM/CW over 144-148 MHz. Introductory offer of $595 includes mic, English manual, plugs, cables and 90 day warranty.

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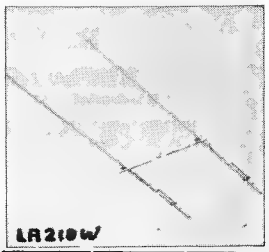
BTF-1 600 ohm balanced feeder	$12
CO AX RG58AU 45c per metre	

LA-210W 10 el stacked beam.

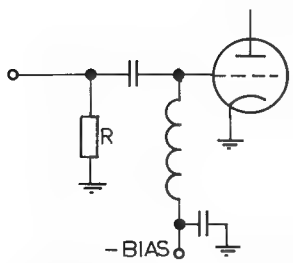
Price $125.



VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM VICOM

precaution regarding a DC blocking condenser. It may be that we would like to avoid this matching unit altogether. Certainly there are some exciters that will match into more than 100 ohms, and some home brewers will waive the 100 ohm input requirement.

There are two special circuits which are worth a mention. Fig. 6 shows the use of a 1:4 transformer wound on a toroid for use in a grounded grid amplifier. About a 2.5 cm toroid with 8 turns primary and 16 turns secondary 18-20 SWG interwound should be suitable. This would cover 80 through to 10 and would not require switching, and would put the input impedance within the range specified in our general requirements.



SPECIAL SIMPLE CIRCUIT FOR DRIVEN GRID

FIGURE 7

The other special circuit is that shown in Fig 7, where a resistor R is placed in the grid circuit. Remembering that the grid impedance is high, R may be made about 70 to 100 ohms. It needs to be a low inductance resistor at the highest frequency used, and large enough to dissipate the power generated in the exciter.

The principle here is that the exciter develops a RF voltage across the resistor sufficient to drive the tube. The power required from the exciter will be similar to that required were the same tube driven in grounded grid, but this circuit has the advantage that the input impedance is well controlled and tuning can be accomplished easily. For instance, the exciter can be tuned into the linear without the power being applied to the linear. The load resistance R will need to be a non-inductive 20 to 50 watt resistor. Such a unit may be the usual combination of a dozen or so 2 watt carbon resistors soldered between two brass discs, the whole lot sitting in a bath of oil.

Reverting for a moment to the circuit of Fig 3, there will be cases where the neutralising capacitor NC may be omitted. This will be the case if a tube designed for VHF or UHF operation is used at lower frequencies. Tubes like the 4CX250 have very good input to output isolation and neutralisation is generally not necessary.

(To be continued)

THE 11 AND 10 METRE BANDS THROUGH THE BOTTOM OF THE SOLAR CYCLE

Sam Voron VK2BVS
2 Griffith Ave., East Roseville, 2069

With the ITU 1979 examination of all amateur bands and their utilization here are details of some efforts being made to more fully utilize our 11 and 10 metre band allocations.

THE 28.5 MHz LOCAL 10 METRE NET

Several stations around Australia and New Zealand are now continually monitoring this frequency. The idea being when you are in your shack to keep your receiver on this frequency. The objective is to develop this frequency as a local communications net and (if busy) as a calling frequency. (28.550 and 28.600 MHz being secondary channels). The main reason for not choosing 28.6 MHz as primary is that during International DX openings this channel would be unusable for local workings: however, 28.5 MHz being on the edge of the 10 metre DX tunable range offers a relatively clear frequency while still allowing DX stations to tune into and join the net.

By encouraging the formation of local nets in Australia, New Zealand and New Guinea we can hope to maintain a high level of activity on 10 metres throughout the year.

In previous years the difficulty on 10 metres has been that operators normally tuned across the band, heard nothing and so went back to the lower frequencies. However with the formation of a local net in Sydney on 28.5 MHz, many were alerted to a recent opening into Europe on the 2/11/75 from 7 to 10 p.m. when DK5MY in Munich was worked with only 80 watts and a quarter wave 27 MHz ground plane, on the 24/11/75 from 3.30 a.m. till 5 a.m. into Northern America, and on 28/11/75 a Sporadic E opening permitted contacts with Hawaiian stations using 20 watts output with KH6IJZ being worked for 25 minutes from 5 p.m.

These show that the bottom of the sunspot cycle can be an exciting period on 10m. Openings to the Americas and Europe will occur especially *at the commencement and break-up of geomagnetic disturbances* (as warned on WIA/IPS broadcasts). Interstate contacts will be regular and strong for nearly 3 months every summer and mid-winter as is the case with 6 metre Sporadic E propagation. Sporadic E, backscatter, and tropospheric modes will also be little affected by the sunspot cycle.

These types of propagation are being observed simply because the existence of local nets serves to foster continuous use of the band. So *why not activate a local 10 metre net in your area?* By encouraging mobile, portable and base station monitoring of 28.5 MHz, together with a weekly submission of 10 metre local and DX news to the WIA Divisions for broadcast, you will soon find you have developed an active net in your area. *Continuous local activity of our upper HF spectrum seems the first step in increasing our utilisation of our single biggest High Frequency assignment.*

This has worked very well on the 160, 11 and 10 metre Sydney nets to such an extent that the two former nets now have a WIA broadcast twice each Sunday and consideration is being given to a 10 metre coverage.

THE 27.125 MHz ALL MODE LOCAL 11 METRE CALLING CHANNEL

More than 1000 persons applied to sit for the first Amateur Novice exam in early 1976. This means that the high level of local activity on the 11 metre band will require stations to shift to another channel as soon as communications has been established. Also, because the Novice will be crystal locked, *amateurs using tunable equipment should be aware of certain procedures which will help him contact our new Novices.*

(1) As there are 22 standardised channels in this band, the typical procedure is to establish contact on the calling frequency (channel 14) and then on phone or CW, arrange to QSY to a clear frequency.

(2) Amateurs using tunable equipment and listening for a reply to their CQ call should remember that the Novice is crystal locked. He or she cannot come onto your frequency and so you should tune ±3 kHz either side of your frequency if you are calling on a net or alternatively tune the whole band for a reply to your call. Remember also to initiate your call on one of the standardised 22 channels as these are the crystals Novices will find most easy to obtain. The 22 channels are:

1.	26.965 MHz	12.	27.105 MHz
2.	26.975	13.	27.115
3.	26.985	14.	27.125
4.	27.005	15.	27.135
5.	27.015	16.	27.155
6.	27.025	17.	27.165
7.	27.035	18.	27.175
8.	27.055	19.	27.185
9.	27.065	20.	27.205
10.	27.075	21.	27.215
11.	27.085	22.	27.225

In Sydney, Ch. 11 is a secondary channel and Ch. 5 is a tertiary one for persons using 3 channel units. Ch. 2 and 21 are not used in many centres such as Sydney due to interference from hospital paging units.

(3) Many amateurs are using inexpensive 1 watt AM walkie talkie sets, and these are capable of coverage of over 1000 miles given the right conditions and antenna arrangements. ■

FURTHER THOUGHTS ON SPEECH PROCESSING

Maurie Evered VK3AVO
13 Sage St., Oakleigh, 3166

This article is a sequel to "Some Thoughts on Speech Processing" (AR October '74). It presents more facts and figures regarding audio levels and a solid-state version of the speech clipper featured previously.

Most of the information about speech processing found in magazines or text books available in Australia is taken from QST and other foreign sources. Because of this it was decided to measure local signals to ascertain the general audio levels being used by amateur operators, to compare various modulation methods and to assess the relative value of the different types of audio processing. After consideration the 160 metre band was chosen for this study. This was for several reasons —

1. It is thickly populated in the area where the study was performed.
2. It is a band where the same station can be heard often and at various times of the day. This enables many measurements to be taken for accurate averages to be obtained.
3. It is occupied by both SSB and AM stations so enabling comparison of modes; very difficult on any other band these days.
4. At least one station on this band has the capability of varying both the degree and type of processing used (i.e. compression or clipping) and is able to provide a valuable signal source for such a study.

The method of measurement used was simple. RF attenuation was applied to bring all signals to the same level on the receiver S meter and the audio recovered from each signal was taken from the receiver at a point not affected by the setting of the audio gain control. This audio voltage was then measured in a circuit that responds to average (not peak) levels. The average value is more meaningful in such a study. The peak level should remain unaltered provided that each signal measured was modulated to 100%. For the record an Eddystone 740 receiver was used for this project.

RESULTS

The results of these measurements are shown in Table 1. The lowest voltage was designated as "O" dB and all other voltage values converted to dB in terms of this reference level. As can be seen there was quite a variation. Such wide variations of course do not need voltage measurements, the human ear can easily detect such extremes.

This variation of audio levels was also seen when AM stations were received on a selective receiver in the sideband tuning position, in this case an FT101B. A comparison was made of the S meter readings of the carrier and upper and lower sidebands of these same stations. The difference between carrier and sideband readings increases, i.e. the sidebands get weaker, as the average audio level decreases. These results explain why surprisingly a signal may read S9 on the meter but the audio gain has to be raised to copy what is being said.

It is interesting that the operators of several stations producing the higher values of Table 1 were told that they were overmodulating but I detected no evidence of this. Even on the old "barndoor" Eddystone their sidebands did not spread unduly. So fellows, do not be persuaded to reduce your modulation too far, there is no point in having an S9 carrier and an S2 sideband!

The next question to be answered was this: —

What is the value of audio processing, does it work miracles or is it useless? The word miracle is suggested when you hear one amateur tell another (usually a friend!) that his signal "has gone up by 3-4 S points", i.e. 18-24 dB, when he switched in his compressor. If this is the case who needs a linear amplifier?

Four types of processing were applied to a signal which was adjusted to 100% modulation in each case—

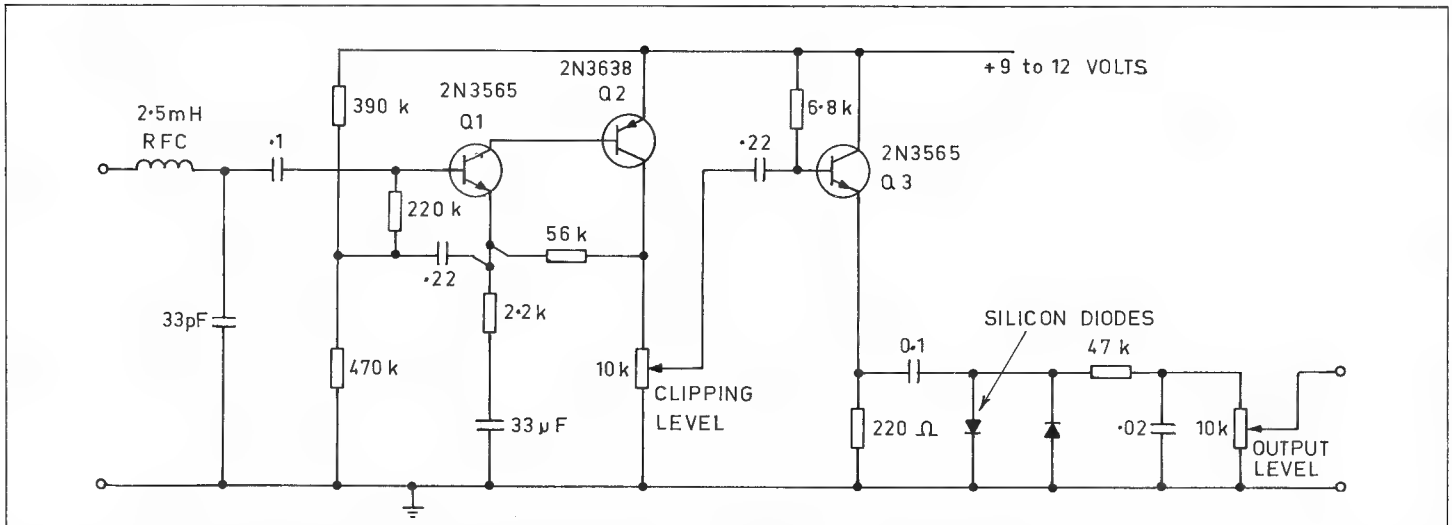
1. Compression with a long decay time.
2. Compression with a short decay time.
3. Light clipping.
4. Heavy clipping.

The recovered audio was measured as in the previous study and compared with the level obtained when no processing was used, this being given a "O" dB reference level. The results are shown in Table 2.

These results largely agree with those reported in QST and elsewhere. Compression, as typically applied, i.e. with a long decay time, is useful for maintaining constant audio level but does little to increase the amount of audio recovered and this is what determines the value of any speech processing that is used. Compression with a short decay time approaches the effect obtained with light clipping and neither of these treatments produces marked distortion. Heavy clipping certainly increases the recovered audio but background noise becomes very noticeable and the distortion level rises markedly, tending to decrease rather than increase the readability. These results indicate that a moderate clipping level is very worthwhile and does help when the going gets tough with signals being received just above the noise level.

SOLID-STATE CLIPPER

Now to the second part of this article, that which enables you to achieve this degree of clipping. This solid-state clipper follows the same general circuitry as its valve predecessor, voltage amplification followed by clipping and filtering to remove the unwanted high frequency distortion products.



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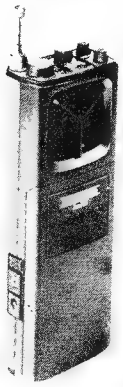

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The circuit is straightforward but some points to note are:—

(a) Transistors Q1 and Q2 provide a high gain low distortion directly coupled amplifier pair using one NPN and one PNP. The 220K resistor and the 0.22 uF capacitor between the emitter and base of Q1 provide a high impedance input to suit a crystal or ceramic microphone.

(b) Transistor Q3 is an emitter follower to provide a high to low impedance match from the voltage amplifier to the clipper.

(c) Clipping is achieved by the use of two back to back silicon diodes which conduct at approximately 0.7 volt on both positive and negative peaks.

Adjustment follows the methods given in the previous article.

Only one will be repeated here, that requiring no CRO.

1. Adjust the transmitter for normal audio gain with the microphone to be used with the clipper.
2. Switch the meter to the ALC position and note the reading obtained in 1.
3. Switch the clipper into circuit and set both controls just high enough to get a meter reading.
4. Advance the clipping control until no further increase in ALC reading is noted, this indicates that clipping is occurring.
5. Advance the output control until the same ALC reading is obtained as in 1 and 2.

TABLE 1

Recovered Audio in dB above reference level	No. of Stations with a particular level
0-1	7
1-2	3
2-3	3
3-4	6
4-5	2
5	2

TABLE 2

Type of Audio Processing	Amount of Audio Recovered, Above Reference Level (in dB)	Distortion
None	0	None
Compression (Long Decay)	1.5	None
Compression (Short Decay)	4	Slight
Light Clipping	5	Slight
Heavy Clipping	7	Very Marked

A steady "H-E-L-L-O" provides a convenient signal for this adjustment. There is little point in advancing the clipping control beyond this level, it does not increase readability but instead produces excessive distortion and splatter.

This unit was built using a 5 x 3 x 2 inch chassis as a box with a lid made from a scrap of aluminium sheet. Any suitable metal box could of course be used if one is at hand. The components were mounted on Vero board but a printed circuit board could be fashioned.

"On air" tests have proved the worth of this little unit particularly when signals are getting weak.

This article would not be complete without some grateful acknowledgements:—

1. To Harold VK3AFQ for suggestions and comments regarding the clipper circuitry.
2. To Tony VK3AML whose excellent signal provided the basis for the comparative figures of Table 2.
3. To the VK3 160 metre gang who popped up so regularly and provided signals for the figures of Table 1.

HEAVY DUTY REGULATED PROTECTED POWER SUPPLY FOR THAT 12 VOLT MOBILE

Bruce Mann VK3BM
Box 724, Swan Hill, Vic., 3585

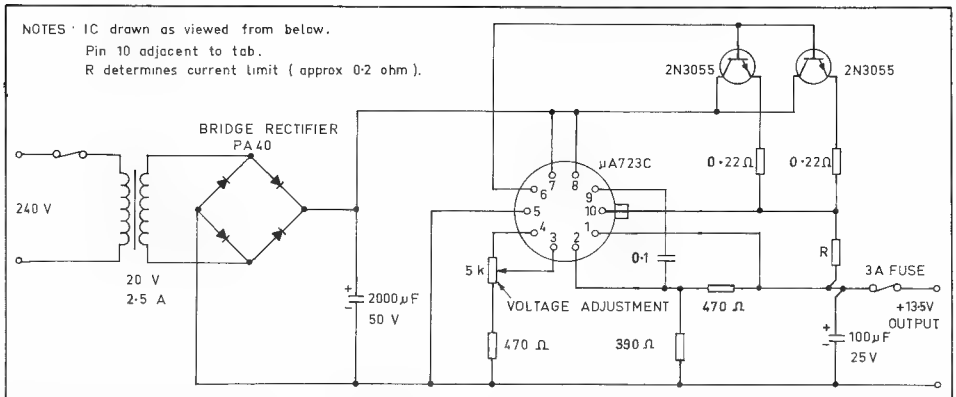
The matching supply for a 10 watt 2 metre FM transceiver was subject to frequent breakdowns. The Japanese transistors or their equivalents were very expensive or unobtainable, so after doing some "homework" from the extensive literature the following circuit was designed using locally available parts.

Each part is operated well below its rating in the interests of reliability and long life. The bridge rectifier is rated at 8A 400V, the IC is capable of 150 mA, but is merely controlling base current to a pair of 4 A transistors of which the maximum load on short-circuit is 2.75 A.

The requirement was for 2.5 A at 13.5 volts. The voltage on this transceiver *must not* exceed 14 volts, but if it falls below 13.5 V, there is a marked fall-off in performance. Since the current drain is only a few mA on receive, but over 2 A on transmit, the need for voltage regulation is obvious.

When, after experiment, this circut was built, it was found that the 5K potentiometer could set the output voltage over a wide range, and that there was no noticeable movement on the voltmeter when the load was varied between 0 and 5 A.

For overload protection, a piece of heavy gauge resistance wire "R" was inserted and the length adjusted until the voltage began to fall rapidly when the current load increased above 2.75 A. This current would not then be exceeded even into a short-circuit. The resistance of this wire is about 0.2 ohm.



13.5 VOLT 2.5 AMP CURRENT-LIMITED REGULATED POWER SUPPLY

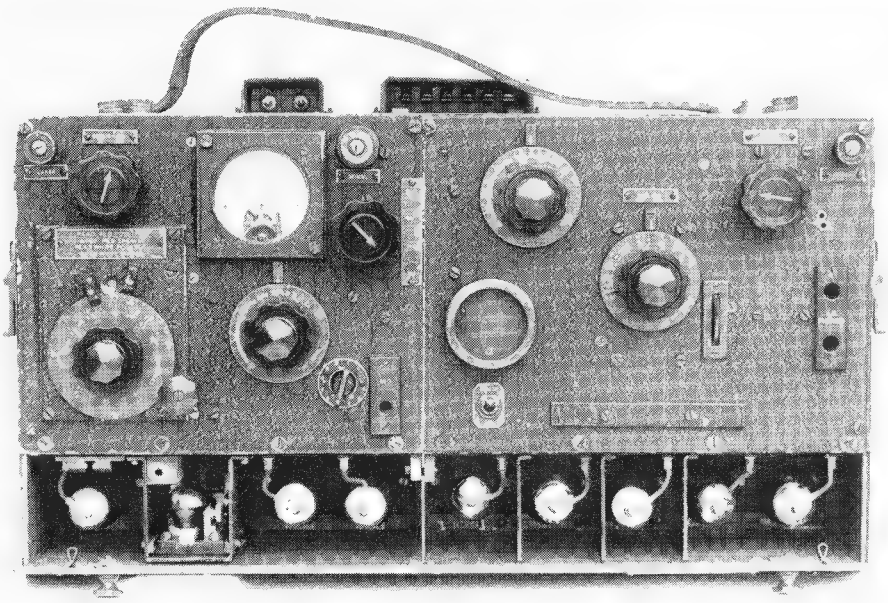
You will notice a 0.22 ohm equalising resistor in the emitter circuit of each 2N3055. One 2N3055 would of course be within its ratings to handle the load — but as mentioned earlier, we are looking for extreme reliability. In this regard, 3 or 4 2N3055s could be paralleled for a greater current capacity with the substitution of a suitable transformer, resistor R and an equalising resistor in each emitter. The 2N3055s are mounted on a 2 inch piece of 4½ inch (35D) heat sink, but insulated from it electrically by mica wafers and bushes for the mounting bolts.

The power supply is mounted in the speaker cabinet with the transceiver above it. The voltage control potentiometer is placed where it can be readily adjusted. Under further consideration for the test bench is a similar power supply with volt and amp meters, front panel control knob, and a much larger range of current and voltage.

(Anyone planning a larger power supply of this type would be well advised to read the letter from VK3ZCM (now VK3AAB) ("Some Deep Thoughts on a Regulated Power Supply") in AR for October 1974. This contains a wealth of information regarding heat sinks in particular. Also, for more than about 3A output the 2N3055s base current will probably exceed the uA723C rating of 150 mA. The additional current gain necessary could be provided by using a driver transistor e.g. 2N3054 in Darlington configuration to the 2N3055 bases. — Tech. Ed.). ■

WORKING WITH THE EARLY 101 TRANSCEIVER

Rodney Champness VK3UG
44 Rathmullen Rd., Boronia, Vic., 3155

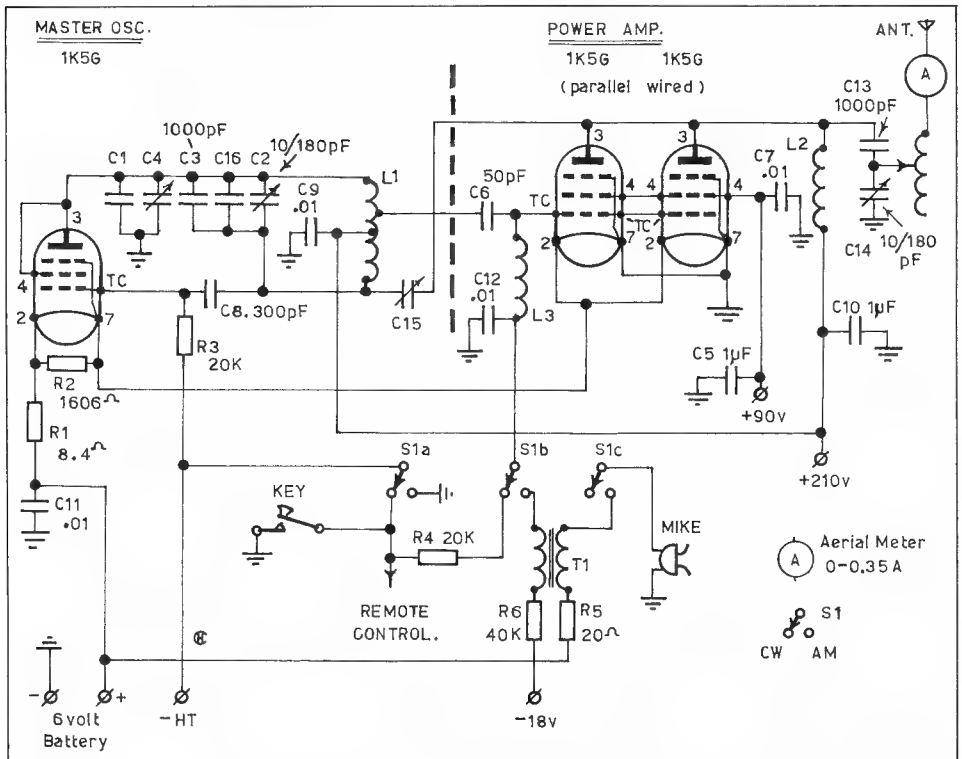


FRONT VIEW OF THE 101 SHOWING THE HORIZONTALLY MOUNTED VALVES

Quite naturally, most people would prefer to have the latest FT101B or FT101E but the early 101, for it's time, was quite a reasonable transceiver and can be upgraded to do a few more things than could originally be done. The 101 and 101A did not have 160 metres, but by fiddling with the VFO and the PA tank circuits, it is possible to put them on this band. The receiver requires alteration to the aerial coil and the oscillator coil.

Chirp on CW seems to be quite a problem on the unmodified 101 and would certainly draw comment from most operators. A few people overcame this problem by crystal locking the transmitter, but this to me does not really solve the problem when VFO operation is the norm. On CW the whole transmitter is keyed using the grid block method and a probable method to overcome the chirp would be to have various stages come on sequentially. Like the FT101B, the early 101 has three valves, with 2 valves in parallel in the final.

By careful inspection of the 101 circuit, it will be seen that on AM operation both sidebands are transmitted. Most SSB transceivers/transmitters only transmit carrier and one sideband (mode A3H). The parallel connected final valves are grid modulated. I altered my FL200 so that I could use gated screen modulation, as it appears it may be slightly more efficient than the A3H mode originally installed as AM.



CIRCUIT OF SENDER TYPE 2J4616 — AWA No. 101

The current drains of the set on battery supply are 0.9 amps with just the DC/DC converter going, 1.1 amps Receive only, 1.7 amps Netting, CW Key up 1.1 amps, Key down 1.7 amps, and 1.5 amps on AM. These current drains may appear to be low when compared to the FT101B, but it must be remembered that the 101 is a relatively low powered set putting out 0.4 watts AM and 0.7 watts CW. The 101 is designed only for 6 V DC operation.

The 101 was used at about the beginning of World War II and was manufactured by AWA. In appearance it is very similar to the FS6, a photograph of which was shown in AR for September, 1973, page 18. It covered the same frequency range 4.2-6.8 MHz. The two valves in the final PA were type 1K5-G. On AM the finals were grid modulated directly via a carbon microphone and matching transformer. Note that no valve modulator was used. The receiver section is identical to that used in the FS6, the transmitter and equipment case being different, although identical in size. The 101 power supply is smaller than that used by the FS6, but then it must be remembered that the FS6 put out about 10 times as much RF power.

The 101 in this day and age exhibits most features thought undesirable for portable equipment, in particular. It is big, heavy (nearly 30 kilograms), flea powered, has limited frequency range, has poor frequency stability, chirps on CW and FMs on AM. However, it will load into a variety of aerials and its circuitry is simple, by today's standards.

Sets of this type in the 1939-1945 era now form part of our history, which is all the more interesting when we compare these old sets with the latest sets. Radio communications has advanced immensely in the 30 to 35 years since sets of this ilk were built, and a look at the 101 transmitter circuit on the accompanying diagram will show you this. ■

NEWCOMERS NOTEBOOK

Rodney Champness, VK3UG
David Down, VK5HP

***Newcomers' Notebook* has been going now for nearly 4 years and in that time subjects of interest to newcomers to this electronic hobby of amateur radio have been presented. Most newcomers will not have been members of the WIA for all of this period so do not have all copies featuring *Newcomers' Notebook*. There are many more subjects that are still to be covered in this column so it is not possible even after 4 years to start repeating some of the original articles in an updated form. For this reason an index of the articles presented over this period is now included. Having found what you want, go and pester someone for a copy of the issues applicable. Please remember that *Newcomers' Notebook* is intended to put you on the right track and most certainly is not an end in itself.**

OPERATING:

Two metre FM repeaters — Facts and Fallacies (Part 1) — July '74.

Two metre FM repeaters — Facts and Fallacies — How they work (Part 2) — August '74.

A low power DX station. Hints on how to set it up. — April '75.

Belonging to the WIA. Why you should belong — August '75.

YRCS AND ZERO-BEAT REPRINTS AND GENERAL HINTS AND KINKS:

June '74, October '74, November '74.

TEST INSTRUMENTS:

Test instruments for the Amateur "shack" (Part 1) — June '73.

Part 2 has not been presented as yet.

YRCS Transistorised Signal Injector — September '73.

Modifications to the RF probe in June issue — September '73.

The Transistorised Signal Injector — How it works, and how to use it — October '73.

YOUR RADIO LIBRARY AND STUDYING FOR OPERATORS EXAMINATIONS:

Your Radio Reference Library — October '72.

Learning Morse Code — Part 1 — December '72.

Learning Morse Code — Part 2a — March '73.

Learning Morse Code — Part 2b — April '73.

Learning Morse Code — Part 2c — May '73.

A Pet Hate. (People who do not read things properly) — January '74.

Amateur Examinations — January '74.

Recommended Text Books — April '74.

Thoughts for Novices — December '74.

Novice — Introduction to Novice Amateur Radio — June '75.

Morse Code — July '75.

TVI, BCI, AFI — TECHNICAL AND SOCIAL ASPECTS:

TVI on 6 metres. Why TV sets respond to amateur 6 metre transmissions when tuned to Channel O — January '73.

TVI, BCI and the Irate Neighbour — January '74.

6 Metre Amateurs and Channel O Viewers can co-exist — May '74.

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A Vertical Aerial — August '73.

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Equipment Layout and Design — Part 1 — March '74.

Equipment Layout and Design — Part 2 — April '74.

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Transistorised 13.8 volts 1.5 amp regulated power supply — July '72.

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A Novice Transmitter — Part 1 — CW section — September '75.

A Novice Transmitter — Part 2 — CW section — October '75.

A Novice Transmitter — Part 3 — Modulator section — November '75.

A Novice Transmitter — Part 4 — Chassis Layout — December '75.

A Novice Transmitter — Part 5 — Transmitter variations — January '76.

A Novice Transmitter — Part 6 — Transmitter variations — February '76.

If there is some particular subject that you would like to be discussed in *Newcomers' Notebook* please contact either David or myself. A few letters have been received and the subjects suggested have been presented where possible. Even with two authors it is far from easy to present all that we would like to present. For example, a cheap, simple, yet effective station monitor, which is easy to use and accurate — is extremely difficult to design. It is easy to build up or buy a complicated, effective monitor at a figure in the region of $200. What do most amateurs use to monitor their stations emissions — something simple — or complex and expensive — or don't they even bother to monitor, relying on the other chaps' comments? ■

IARU NEWS

Continuing our examination of the ITU Table of frequency allocations the band 1.215 to 1.300 GHz is allocated to Radiolocation as the primary service and amateur as the secondary service in all Regions. This band is also allocated to the fixed service in the USSR and the other E. European bloc countries whilst in France, Belgium, Netherlands, Portugal, Norway and Sweden this band is also allocated to the radionavigation service. This band is also allocated to the fixed and mobile services in Indonesia, Japan, China, India, Pakistan, Switzerland and (the old) Portuguese overseas Provinces in R1 south of the Equator. In W. Germany the band 1.250 to 1.300 GHz is allocated to the amateur service.

The next higher amateur band is 2.3 to 2.45 GHz which is shown as a secondary service in all Regions. In R2 and R3 Radiolocation is the primary service and the fixed and mobile services are also secondary services along with amateurs. In R1 the Fixed Service is the primary service with amateur, mobile and radiolocation as secondary services. As with the previous band there are a number of variations affecting European countries. In Japan, India and Pakistan the band is allocated on a primary basis to the fixed, mobile and radiolocation services and on a secondary basis to the amateur service. The frequency 2.45 GHz is designated for ISM purposes world wide except for the E. European bloc countries where 2.375 GHz is used; emissions are confined within + or —50 MHz of the frequencies designated and, as usual, all the other services must accept any harmful interference from IMS.

In R2 and R3 the amateur service is the secondary service to Radiolocation in the band 3.3 to 3.4 GHz but in R1 this band is for Radiolocation only with additional allocations by various European countries.

The band 3.4 to 3.5 GHz is allocated to both Fixed-Satellite (space to Earth) and Radiolocation as the primary services with amateur as the secondary service in R2 and R3 but in R1 the band 3.4 to 3.6 GHz is allocated to the Fixed, Fixed Satellite (space to earth) and mobile as primary services and radiolocation as the secondary service. However the band 3.4 to 3.475 GHz is also allocated to the amateur service on a secondary basis in the UK, W Germany, Austria, Netherlands and Israel. The Australian table has a note that in planning the use of the bands 3.4 to 3.5 and certain higher frequency bands (not affecting amateur allocations) account will be taken of the frequency requirements for Commonwealth Government services.

In all 3 Regions the band 5.65 to 5.67 GHz is allocated to Radiolocation as the primary service and amateur as the secondary service. In all 3 Regions the band 5.67 to 5.725 GHz is allocated to Radiolocation as the primary service with the secondary services being amateur and space research (deep space). The band 5.75 to 5.85 GHz in R1 is allocated to Fixed-Satellite (earth to space) and Radiolocation as the primary services and amateur as the secondary service whilst in R2 and R3 the primary service is Radiolocation and amateur as the secondary service. Once again there are various exceptions and variations. In W. Germany the band 5.65 to 5.775 GHz is allocated to the amateur service and 5.775 to 5.85 GHz is allocated to the amateur service and 5.775 to 5.85 GHz is allocated to the fixed service. 5.65 to 5.85

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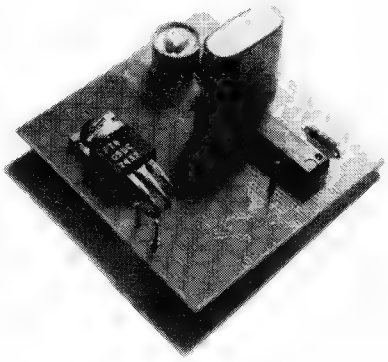

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GHz is also allocated to the fixed and mobile service in Indonesia, Japan, China, India and Pakistan. In all countries 5.8 MHz is designated for IMS + or —75 MHz under the usual conditions. There are other variations mainly affecting the E. European bloc countries. In R2 the band 5.85 to 5.925 MHz is allocated to Radiolocation as the primary service and amateur as the secondary service. Radio astronomy observations are being carried out between 5.75 to 5.77 GHz in a number of countries under national arrangements and administrations are urged to take all practicable steps to protect radio astronomy observations from harmful interference.

In all 3 Regions the band 10 to 10.5 GHz is allocated to Radiolocation as the primary service and amateur as the secondary service. The band 9.975 to 10.025 GHz may be used by weather radar on meteorological satellites. In W. Germany 10.25 to 10.5 GHz is allocated to amateur and 10 to 10.25 GHz is also allocated to the fixed and mobile services which also enjoy the allocation 10 to 10.5 GHz in Japan and Sweden.

The last of the amateur allocated bands is the band 24 to 24.05 GHz which is shared with Amateur-Satellite. 24.05 to 24.25 GHz is allocated to Radiolocation as the primary service and amateur as the secondary service. 24.125 GHz (+ or —125 MHz) is designed for IMS under the usual conditions. In the E. European bloc countries 24.05 to 24.25 GHz is also allocated to the fixed and mobile services. In the Australian tables 24.25 to 25.25 GHz ground-based radio navigation aids are not permitted except where they operate in co-operation with airborne or shipborne radionavigation devices.

There are no other ITU amateur allocations. Amateur and amateur satellite allocations are to be sought for WARC 1979 for various other frequency bands particularly above the 24 GHz band for discussion at the IARU R2 meeting this month. These are 48 to 50 GHz, 71 to 76 GHz, 165 to 170 GHz, 240 to 250 GHz and 300 GHz up. All these are in unallocated ITU bands.

It is probable that the amateur frequency requirements for all Regions will be firmed up at the inter-regional IARU meeting scheduled to follow immediately after the conclusion of the R2 meeting in Miami. ■

INTRUDER WATCH

Alf Chandler, VK3LC
1536 High Street, Glen Iris, 3146

I wish to stress upon Members that since the PMGs department has been separated into two separate departments liaison with the Amateur Service has been upgraded, and we now have full co-operation with the newly designated branch. The name is now: "Licensing, Policy and Operations Branch"; "Radio Frequency Management Division"; "Postal and Telecommunications Department". Thus, the activities of the Branch, insofar as the Intruder Watch is concerned, have been upgraded and full co-operation is now being experienced by your Federal Co-ordinator on intruder problems.

Whereas, before this upgrading, the majority of Amateurs were of the opinion that the Intruder Watch was a waste of their time in reporting because officialdom did nothing to further the cause, now, by the co-operation between the Branch and the Amateur Service, some measure of success should be manifest in the reporting of intruders in our Amateur bands.

One of the points stressed by their personnel is the fact that we do not have enough Observers to file sufficient reports for the authorities to act upon. They say that when only two or three individuals file reports on a particular intruder it lacks credibility and it is not sufficient evidence for them to do anything about it.

They need lots of reports so that their monitoring stations can be alerted to listen for the intruder. It is the reports that their monitoring stations supply that they act upon, and they have to have positive identification as to the country of origin of the intruder, and the fact that it is an intruder before they can get Governmental sanction to file a complaint to the Administration concerned. The Amateur Service is to be looked upon as the initiating service, the watch-dog to alert the monitoring stations, as the official back-up service, to act.

So, as in any Public petition or official relation, it is the weight of numbers that counts, and the Licensing Branch is no exception to that, but will use the Amateur reports as a starting point if they can get enough Observers to inform them of any particular frequency or station causing intrusions to the Amateur Service.

The words "harmful interference" as used extensively in the past are now discontinued and "intrusions" substituted and, although most Amateurs change frequency when experiencing interference because of the flexibility of band frequencies, reports are to be designated as "intrusions" but causing interference to their Amateur stations.

In the WIA we need a program of Member public relations to get more observing stations to report infringements of Commercial intrusions into our bands.

Thus, I am asking all Divisions for support in this important aspect of Amateur Radio to obtain Member participation. There are co-ordinators in all States who have the knowledge and the facilities to help individual Members to become acquainted with the types of signals to listen for; and who have report forms and literature appertaining to the Intruder Watch, and I urge every Member to give this matter deep consideration.

We need at this very moment to take steps to preserve our frequency assignments from the intrusions of Commercial interests and the Intruder Watch is one very important method of so doing, by alerting our Administration. They are too busy with this and other things to police our frequencies unless alerted by us as to what is going on.

I stress once again upon Divisions to give this problem deep thought and to come up with ways and means to increase activity in this Intruder Watch.

If you do not know who your co-ordinator is, write to me direct. ■

VHF-UHF AN EXPANDING WORLD

Eric Jamieson, VK5LP
Forreston, 5233

AMATEUR BAND BEACONS

VK0	VKOMA, Mawson	53.100
	VKOGR, Casey	53.200
VK1	VK1RTA, Canberra	144.475
VK2	VK2WI, Sydney	52.450
	VK2WI, Sydney	144.010
VK3	VK3RTG, Vermont	144.700
VK4	VK4RTL, Townsville	52.600
	VK4RTT, Mt. Mowbullan	144.400
VK5	VK5VF, Mt. Lofty	53.000
	VK5VF, Mt. Lofty	144.800
VK6	VK6RTV, Perth	52.300
	VK6RTU, Kalgoorlie	52.350
	VK6RTW, Albany	52.950
	VK6RTW, Albany	144.500
	VK6RTV, Perth	145.000
VK7	VK7RTX, Devonport	144.900
VK8	VK8VF, Darwin	52.200
3D	3D3AA, Suva, Fiji	52.500
JA	JD1YAA, Japan	50.110
VE	VE1ATN, Canada	50.056
KG6	KG6JDX, Guam	50.105
	KG6APP, Guam	50.150
	K2IRT/KG6, Guam	50.098
ZL1	ZL1VHF, Auckland	145.100
ZL2	ZL2VHP, Palmerston North	52.500
	ZL2VHF, Wellington	145.200
	ZL2VHP, Palmerston North	145.250
	ZL2VHG, Palmerston North	431.850
ZL3	ZL3VHF, Christchurch	145.300
ZL4	ZL4VHF, Dunedin	145.400
ZL2	ZL2MHF, Upper Hutt	28.170

The 6 metre beacon proposed for VK7 on 52.400 appears not to have made it on the air as yet, so it has been withdrawn from listing pending advice as to when it is in actual operation.

A listing of the known overseas beacons on six metres has been continued this month as the March-April period favours possible trans-equatorial propogation (TEP) and listeners in good locations should keep an ear on the 50 MHz end of six metres, particularly around the period of late morning to early afternoon, and again towards the latter part of the afternoon. In northern latitudes evening contacts are sometimes found possible. Six metres is a band often full of surprises. Even though the DX may have disappeared from the VK scene in general, other areas may be offering at this time of the year.

The VK3 two metre beacon has had an overhaul and now, with the antenna re-located, appears to be putting in a consistent signal to Mt. Gambier most evenings. Perhaps it may now be possible to hear it in Adelaide. The Adelaide area operators are looking forward with anticipation to the completion of the beacon in Mt. Gambier which will provide the only beacon within a consistent operating range of Adelaide, and thus be able to give an indication of possible band conditions. The FM repeater in Mt. Gambier will also be awaited with interest as it also could provide us with indications of distance working. It has now been confirmed that it will operate on Channel 3.

Please note also that the Mt. William repeater in VK3 has changed operation from Channel 1 to Channel 7, and should not suffer the co-channel interference from Melbourne repeater on Ch. 1.

MOONBOUNCE REPORT

From "The Propogator", newsletter of the Illawarra Amateur Radio Society, N.S.W., comes some information of their activities on the EME circuit. "The December EME tests provided a first contact with W9GAB whose signals peaked at 6 dB over noise. A further contact was made with K2UYH (to 11 dB over). A few words were copied of his SSB under conditions of deep fading, using 2.1 kHz bandwidth.

"During the subsequent European test period, approx. 8 hours later, contact was made with F9FT (9 to 6 dB over) and PA0SSB was heard calling us but no contact was made. A final check of our echos revealed that the dish was pointing 2½ degrees off the moon. Heavy cloud had prevented visual checks overnight and insufficient correction had been made at the start of the second test period for relative angular velocity between moon and the original sun reference hour angle, hence the lower than normal signal from F9FT.

"A verbal approval was received in December to allow EME transmissions between 432.000 and 432.050 MHz on a strictly non interference basis; the Drake 2B IF channel receiver was modified to allow remote shifting of its calibration oscillator frequency. This provides measured off-set from WWV at 15 MHz as a frequency reference on its 100 kHz crystal harmonic at 432 MHz for adjustment of the transmit frequency.

"The January tests were another all night effort but results more than compensated for lost sleep First contacts were made with W1SL (on our 10th attempt). KOTLM, WOYZS who called us in our half hour CQ period, and finally with JA1VDV (the first VK — JA UHF contact) on our first attempt! This contact was on 432.045 MHz and illustrates the need for transmit frequency change capability as 432.000 is usually not available in Japan, being a national FM calling frequency.

"The European test period some 5 hours later produced contacts with F9FT and I5MSH. ZE5JJ was heard again, but he had a receiver pre-amp

problem and could only give us a 'T' report. Heavy rain at both ends did not help in setting up for this one".

On 144 MHz EME Chris VK5MC reports working two new stations in the period 7-8/2 and 11/2, being WA7BJU and W4WNH/8. No other details are available at the moment. We have not heard from Ron VK3AKC for a long time of his exploits on 1296 MHz EME, and what have you been doing, Ray VK3ATN? Some reports on activities would be appreciated.

70 cm BAND PLAN

Under the heading "The proposed 70 cm bandplan as related to EME activity" comes a further interesting short discussion from "The Propogator", reading as follows for your information.

"Simultaneous activity on several frequency channels is now becoming not unusual during EME test periods. Doppler shift of +/— 1½ kHz maximum plus SSB bandwidth requirements are now clearly demonstrating the inadequacy of the proposed 10 kHz segment for exclusive EME operation.

"The day is rapidly approaching when ham stations operating here in VK with 150 watts input and beams with 15 to 18 dB gain on 70 cm will be capable of causing QRM to stations in Europe and America working over the EME path on the same frequency. This is because the moon has to be near the horizon for long (earth) distance EME contacts and the sensitivity of EME receivers is such that very low level signals can be a problem as QRM. (The current receiving system at VK2AMW has a threshold sensitivity of —154 dBm or 0.004 microvolts). Antenna gain has, of course, nothing to do with the achievement of this sensitivity. The VK station causing the interference may not be able to hear any trace of the EME station being QRMd.

"It is of interest to note that the only other mode of 70 cm operation which covers international contacts (satellite mode) has been provided with a 3 MHz wide segment in the 30 MHz wide (in VK) band. Hence 50 kHz from 432.000 to 432.050 MHz s suggested for exclusive EME work.

"There are a number of other very good reasons now becoming apparent as to the need for a much wider segment of the 70 cm band being allocated for exclusive EME operation, but the above may be of some interest to those hams who have not had UHF operating experience".

CAIRNS AWARD 1976

This award may well be of interest to VHF operators as well as those on the HF bands. Requirements are during 1976 to work three Cairns stations (i.e. within a 100 mile radius of Cairns) for which a very attractive award is being offered. As the next summer DX season will be in full swing before the end of 1976, VHF operators on 6 metres might well try for the award. A copy of the log entries is needed, and should be sent to the Cairns Amateur Radio Club, via Station VK4HM, P.O. Box 1426, Cairns, Qld., 4870.

It is also hoped that VHF operators shared in the award for contacting five stations in Mt. Gambier during the celebrations there in February and March. VK5BMG was a required contact. Entries to the South East Radio Group, Box 1103, Mt. Gambier, S.A. 5290.

JOTTINGS FROM AROUND THE BANDS

Good conditions prevailed at the end of January on 144 MHz which allowed VK3YJP/5 using an IC202 to go up on top of Mt. Lofty and work Fred VK3AZG in Melbourne. Not bad for the 202 and a whip antenna . . . Kerry VK5SU at Ceduna worked into Adelaide on 1/2, 2/2 and 4/2 via Ch. 1 repeater, and also reported contacts on 2 metres on 28/1 between Albany, W.A. and Gippsland, Vic. . . . 6 metres opened up well on 15/1 and 16/2 to VK5, Lindsay VK4AAL very strong for hours, Claud VK4UX also, and down south VK7ZWW was S9. Mike gave brief details of the proposed 6 metre beacon down there, call sign VK7RNT, 25 watts, FSK to half wave dipole, and operating on 52.400 MHz It awaits PMG approval before commencing operation . . . Mike VK7ZWW operating portable from Mt. Barrow worked VK4ZZB/4 on 144 MHz at 5 x 4 on 15/2 in the evening. Good work Mike! . . . Steve VK5ZIM reports there are now at least 25 stations in the Adelaide area using the IC202 144 MHz SSB transceiver, plus those with other equipment. This situation is probably similar in other capitals, so if their owners do the right thing and erect a good antenna, and possibly an additional 30W amplifier, good things could come of 144 MHz SSB before long . . . Clem VK5GL took his IC202 with him to Stansbury on Yorke Peninsula, and was able to work back to Adelaide quite well with his 3 W PEP and a 3 el. beam inside the holiday house, distance probably about 70 miles. To prove that it could be done, I swung my antenna to the west, fired up straight through my 30 dB mountain, and worked Clem, 5 x ¾ from me, and 5 x 6 from him to me, a much more thrilling contact than one of those S9 contacts!

144 MHz BAND PLAN

In a letter from Geoff VK3AMK he mentions the explosion of activity on the low end of 2 metres since the introduction of the IC202. I agree when he says this additional activity is extremely welcome, and regardless of what some people think and say about commercial gear there is no doubt the availability of a good rig at a reasonable price has restored activity to the low end of the band. However, this sudden increase has brought with it some difficulties, sometimes due to thoughtlessness and to a form of selfishness mainly brought about by lack of experience.

Geoff mentions that as a result of some of this activity Daryl VK3AQR has drawn up a band plan to try and get activity on the low end of 2 metres sorted out into some order to benefit everybody. I understand Daryl proposes submitting the plan to AR for general consideration but so far has not done so. In the meantime Geoff submits an outline of his plan and comments are called for from interested operators.

(a) 144.000 to 144.200 for DX working only (i.e. no local chit chat over the back fence, tests etc.) 144.000 to 144.010 for EME only. (I would like to see this extended to 144.020 as world operating indications are tending to show that 10 kHz is too narrow a segment — refer to EME report this column this month . . . 5LP) 144.010 to 144.050 for DX CW only. 144.050 to 144.200 for DX phone working only, primary calling frequency to be 144.100, secondary calling frequency 144.150. These frequencies should be respected for what they are, calling frequencies. Once contact is made QSY off the frequency please. Stations using 144.000 to 144.200 to be narrow mode only with VFO control.

(b) 144.200 to 144.500 to be used for all local working, skeds, overflow from segment below if that section is very busy, 144.300 primary calling frequency, 144.350 secondary calling frequency. Again narrow mode and VFO control.

(c) 144.500 to 144.700 exclusively for beacons. The present situation is crazy, thirteen 2 metre beacons in VK and ZL spread from 144.010 to 145.400. How many people ever listen for most or any of them? Particularly when high up in the band.

The beacon plan is as follows:

(1) provision for a minimum of three exclusive beacon frequencies per VK call area.

(2) each beacon to be identified by frequency as well as call sign, i.e. each beacon to have a frequency allocated relative to the call area number.

(3) the primary beacon for each call area to be allocated on a 10 kHz channel system in the 144.500 to 144.600 segment. Secondary beacons in each call area to be allocated on a 10 kHz channel system in the 144.600 to 144.700 segment. Tertiary beacons (and subsequent if ever required) in each call area to be allocated 5 kHz above the secondary beacons in that area. — e.g. VK6 primary beacon Perth 144.560 (the 60 kHz means VK6), Secondary beacon Albany 144.660, tertiary beacon Carnarvon 144.665.

Thanks Geoff for going to the trouble of letting me know, and to Daryl for starting the ball rolling. It seems a fair plan at this stage. I would like to think about it further, and I hope others also will give it some thought. I am pleased to see that it embraces the thoughts I had several years ago when I advocated beacons in the region 144.500 to 144.700, this being the same end of the dial scale on the average transceiver but one 500 kHz segment higher. Mostly it simply means turning the band change switch one position and you can then tune in the beacons — simple?

The other important point about the proposed beacon segment is that the average 2 metre yagi antenna is still likely to give some reasonable performance up to 144.700 and a bit higher, and plenty of converters will give reasonable performance over a 1 MHz bandwidth, so it all fits in quite well.

If anyone is writing to me, and I hope you will, with news for this column, your comments on the proposed band plan would be welcome. Constructive comments please, it is no use condemning some aspect of the plan if you are unable to offer an acceptable or reasonable alternative. When Daryl publishes the whole plan in greater detail you may be able to better understand the full implications; in the meantime this summary is published to start you thinking, perhaps in the right direction.

There does not seem to be a lot of other news at the moment, so we will close with the thought for the month: "Manners are like the zero in arithmetic: they may not be much in themselves, but they are capable of adding a great deal to the value of everything else".

The Voice in the Hills. ■

MAGAZINE INDEX

Syd Clark, VK3ASC

BREAK-IN November 1975

Solid State Circuits for SSB; A Linear for the ZL2BDB Transceiver; Jason and the Argonauts.

December 1975

The History of the Wellington VHF Group; Wellington VHF Group Hut, Mt. Kakanui; Frequency Deviation Measurement; Wot — No Dips???; Getting on to Micro-waves; Mounting of Yagi Aerials.

CQ MAGAZINE October 1975

A Programmable Keyer for the Contest Operator; Antennas: New VHF Antenna; Regulated 200 Watt 12 Volt DC Power Supply; Alice in Basic-Land; Don't Build a Repeater; Using Epoxy Cement In Electronic Projects; Peak Envelope Power — What Is It?; The Sasa Story; The Optacon; Math's Notes — Simple mast construction.

HAM RADIO October 1975

Receiver Noise Figure, Sensitivity and Dynamic Range; High Dynamic Range Receiver Input Stages; Solid State Communications Receiver; Low Cost 1296 MHz Preamplifier; Low Noise 28-30 MHz Preamplifier; BFO Multiplexer; High Performance Balanced Mixer for 2304 MHz; Satellite Receivers for Repeaters; Crystal Discriminator for VHF FM.

November 1975

High Performance VHF FM Receiver; SSB with TTL ICs; RTTY Line End Indicator; Tuneable Audio Filter for CW Communications; SSTV Preamplifier; Crystal Mixer; Binaural CW Reception; Varactor Controlled VFO; Soldering Iron Holder; Dipole Antennas; Collins R390A Modifications.

December 1975

Collins S-Line Frequency Synthesizer; High Frequency Linear Amplifier; Introduction to Microprocessors; Squelch Circuits for Transistor Radios; 2304 MHz Power Doubler; 1296 MHz Bandpass Filters; UHF Frequency Scaler; 1968-1975 Cumulative Index.

QST November 1975

Ideas on 2 Metre FM Mobile and Portable Antennas, A Morse Code to Alphanumeric Converter and Display; A Resistive Antenna Bridge — Simplified; Pattern Factors for Elevated Horizontal Antennas Over Real Earth; A 5c Transistor Tester; Linear Tuning — What Price?; A General Technique for Satellite Tracking; Modifying the Heath HW16 from 15 to 20 Metres; Improved Frequency Stability for the Heath SB-300.

December 1975

A Calorimeter for VHF and UHF Power Measurements; A Morse Code to Alphanumeric Converter Part 2; A Transmission Line Low Profile Antenna; A Universal Transistor Tester; A Modular Transceiver for 1296 MHz; Read Capacitance with your VOM; A Tuning Aid for SSTV; Slippers for the HW-7 Transceiver.

RADIO COMMUNICATION November 1975
A 70 to 432 MHz Transmitter Converter; Yaesu Receiver FR101; Annual Report of RSGB.
December 1975
A Hybrid Ring Converter for 70 cm; Ham-M Operation for the Blind; Technical Topics.

RADIO ZS October 1975
Solid State 10/2M SSB Transverter; Operation of Miniature Lamps at other than rated volts.

November 1975
The Grahamstown Repeater Governor's Kop; Those were the Days; Hams go to War; A Computer Controlled VFO; Robin Hood; The Best of QSX; Mosquito Repeller; The Ground Plane Antenna; Long Distance Communication on VHF.

December 1975
IARU Region 1 News; Tygerberg Branch; The VHF-UHF Watchdog Calling System; Small Loops for the Lower Frequencies; A Review of 2 Metre Bandplanning in S.A.

SHORTWAVE MAGAZINE October 1975
Line Termination in Aerial Design; Compact Modulator PSU.

November 1975
Modifications for the KW-2000 Transceiver Series; Active Aerial Unit; PSU Remote Sensing. ■

IONOSPHERIC PREDICTIONS

Len Poynter, VK3ZGP

A SUMMARY OF PREDICTIONS FOR THE DATE OF CYCLE 20 SUNSPOT MINIMA

Average Cycle Characteristic — Mid 1975 — Smoothed No. 5.
Waldmeier — Early 1975 — No numbers predicted.
Jacobs (CQ Magazine) — Late 1976 — Smoothed No. 5 — No numbers predicted.
Lincoln — McNish NOAA — Early 1977 — No numbers predicted.
Boykin — Richards NASA — Late 1976 — Smoothed No. 12.
[illegible]en and Lintz (CQ Magazine) — Mid 1977 — [illegible]moothed No. 3.
Others — During 1977 — No numbers predicted.

From these predictions, it would appear that the minima is as hard to foresee as is the daily sunspot count. However, they are talking about the smoothed running 12 month number, derived from the formula

$$Rs = \frac{\frac{1}{2} RM1 + RM2 + RM3 \ldots RM12 + \frac{1}{2} RM13}{12}$$

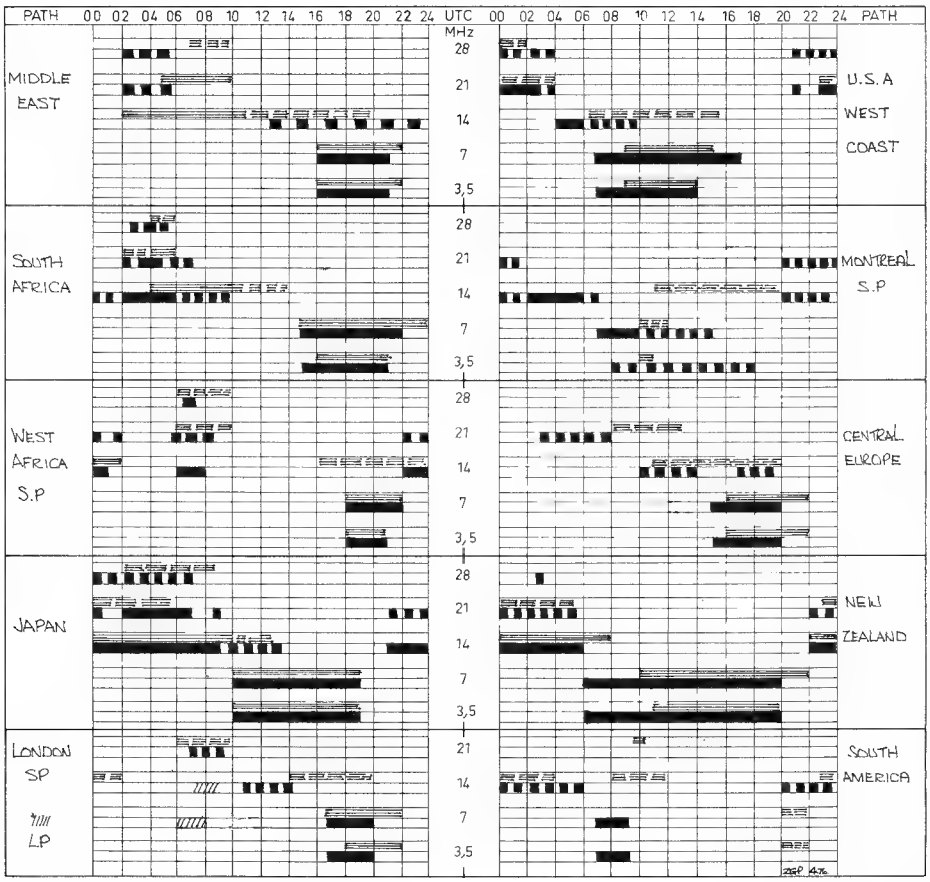
Where RS = 12 month smoothed number centred on Rm7
Rm = monthly mean unsmoothed.

Whilst the last 12 months have shown some signs of cycle 21 sunspots appearing, their appearance is counted along with cycle 20 spots. Some bursts of new activity have been noted in July and August 1975 but have quietened down again since early 1976.

The latest projections at the end of January from Zurich were April 6, May 5, June 5, July 4.

If the monthly count drops to the low of Jan. 76 at 8.6 it is within the realms of possibility that Boykin-Richards of NASA is fairly close to the mark. Guess we will just have to wait and see.

The whole scene looks like very mediocre conditions for some time yet. Of course the seasonal changes along with the sudden bursts of activity will produce some good periods. Generally the next 12 months will see an overall decrease in [illegible]d openings, particularly the higher bands. 40, [illegible]and 160 M should produce increased activity during the darkness period over the all darkness paths. Many are hunting 5 Band DXCC, and they mostly QSL direct. Be aware when and where to listen. The prediction charts I find are a fair guide to times. Daily variation in conditions will play an important part.



LEGEND:
Lines — From Western Australia.
Bars — From Eastern Australia.
Full lines or black bars — more than 50% of the month but not all days.
Broken Lines or Black Bars — better than 20% of the month.
At least 2 Geomagnetic disturbances expected. One early and another late in the month.

As the solar activity decreases, the geomagnetic disturbances have an increased effect. Perseverence does pay off in the long run. ■

REPEATERS

Ken Jewell, VK3ZNJ
Peter Mill, VK3ZPP

As most readers will be aware there has been a dramatic increase in the number of Repeaters throughout Australia in recent years and it was felt that the time had come for a separate column in Amateur Radio to fulfil the needs of this fastest growing aspect of the Amateur scene. It will be up to you the FM users to ensure that this column is a success, as we must have information from all Repeater Groups and Committees to make it worthwhile each month.

Criticism has been levelled at the accuracy of repeater information published in AR in the past, but those who have tried to get this data have not had an easy task. Now is your chance to have accurate information about your Repeater put into print and we seek your co-operation. Please send all copy to PETER MILL, VK3ZPP, 2 IVY ST., PARKDALE, VIC., 3194, and he will see that it will be printed. It is hoped that each month there will be a table of repeater details progressively for each State and advice of changes as they occur.

FEDERAL NEWS
On 1st March, 1976, the Federal Repeater Secretariat, formerly based in South Australia, commenced operation from Victoria. The Secretariat consists of Chairman Ken Seddon VK3ACS, Committee members John Martin VK3ZJC, Peter Mill VK3ZPP, corresponding consultant Ken Jewell VK3ZNJ. The first meeting of the FRS was held on the 26th February 1976, and a great deal of business was concluded, including preliminary work on the 70 cm band Repeater Plan with the meeting finishing well after midnight. Being close to the Headquarters of the PMG Department, and the Federal Executive, it is hoped that problems with repeater licensing in some States will soon be resolved.

VICTORIAN NEWS
On Saturday, 28th February 1976, the annual State Repeater Meeting and election of office-bearers for the State Repeater Committee was held in Melbourne. Representatives of all known VHF and UHF Groups attended this meeting which formulates the State policy on repeaters and processes applications and assists with problems in relation to repeaters.

At the meeting Surgeon-Captain Jim Lloyd VK3CDR, representing Federal Executive, spoke on recent discussions with the PMG Department regarding the development of new repeater licensing conditions and the standardisation of requirements throughout Australia.

The business of the meeting commenced with the election of office-bearers for the next 12 months and the results were:

Old Committee — Chairman: Peter Linden VK3BX; Vice-Chairman: Peter Mill VK3ZPP, Secretary: Ken Jewell VK3ZNJ; Publicity: Geo. Francis VK3HV.

New Committee: Peter Linden VK3BX; Peter Mill VK3ZPP; John Bills-Thompson VK3AAA; Daryl St. John VK3AQR.

The committee and all representatives wish to

thank the two retiring members VK3HV and VK3ZNJ for their excellent work in setting up operations from the beginning last year.

During the meeting several proposals were submitted to the vote and subsequently adopted and where applicable will be forwarded to the FRS for necessary action.

The first of these was the creation of an 8th repeater channel using 146.05 MHz input (channel 41) and 146.65 MHz output (channel 53). If approved by the necessary controlling bodies, this channel will be used in Victoria as a low power (to 2.5 W) local community fill-in repeater channel. It is expected that repeaters on this channel would not be sited on a high spot and could be situated as close as 80 km apart.

Re-numbering of repeaters was also adopted, numbering from channel 1 to 8 in ascending order of frequency and input channel. This was done to easily identify the frequency of the repeater and to remove the stigma of "second class" channels for the existing 5, 6 and 7 repeaters. It was agreed by all Groups that they would, where possible, standardise on identification, time out length, silent tail period, and other technical requirements in order to give repeater users standard facilities throughout the State. Approval was also given by the meeting to the Geelong Group to proceed with a feasibility study on channel 3 for a repeater in the Otway Ranges in the south west of Victoria.

NEW SOUTH WALES NEWS

It is hoped that there will be a State Repeater meeting in Sydney in the near future and, resulting from this, a State Repeater Committee. Comments from NSW indicate that perhaps they also have grown out of the present 7 channel system. Should we therefore keep increasing the number of VHF channels for repeaters thus reducing the spectrum for simplex operation and rendering obsolete present equipment if we expand into the next MHz. If support for the 8th channel, as proposed in Victoria, is forthcoming from NSW then this could give some breathing space. There are two repeater channel changes due for change over on 2nd May, 1976; they are Gosford to channel 5, and Newcastle to channel 3. Unfortunately there are no other details available.

WEST AUSTRALIAN NEWS

There is very little available at the present time except that Channel 1, which is situated at Rollystone at a height of 1200 ft. ASL, is now working well with no other details to hand. Just commissioned is Channel 2 at Wireless Hill which is designed to cover the dead spots in Perth and to the north. It is located on the coastal plain north of Perth at an elevation of 200 ft.; as yet no details about callsign, power, range, etc.

AFTERTHOUGHT

We as Amateurs have, in the past, been in the forefront of radio experiments. Should we now continue to stack repeaters into the two metre band when we will have available, in the very near future, at least 30 repeater channels in the 70 cm band? Perhaps some specialist groups such as RTTY operators or even Radio Clubs could think about this as a combined voice on the air in the state of the art. ■

CONTESTS

Ken Phillips, VK3AUQ
Box 67, East Melbourne, 3002

CONTEST CALENDAR

April
24/25 PACC Dx Contest (Veron)
24/25 Bermuda Phone

May
1/2 Helvetia 22 Contest
8/9 Bermuda CW
22/23 USSR Dx Contest

PACC Dx CONTEST
Starts: 1200 GMT April 24.
Ends: 1800 GMT April 25.

Frequencies 1.8 thru 28 MHz CW and phone one contact per band per station either CW or phone (but no cross mode) for QSO and multiplier credit (CW only on 160). Send RS(T) and serial number, PA/PI/PE will send RS(T) plus number plus 2 letters, indicating the province. There are 12 provinces — GR, FR, DR, OV, GD, UT, NH, ZH, ZL, NB, LB, YP. Each contact worth 3 points.

Final score is total contact points multiplied by the number of provinces worked on each band (maximum of 72).

Logs should have date and time GMT, stations worked, transmitted and received numbers and letters, multiplier column for each band, and points.

Logs must be sent to Veron Contest Manager PA0DIN P.O.B. 1166 Arnhem, The Netherlands, post marked before 30th June.

BERMUDA CONTEST
Phone April 24-25, CW May 8-9.
Starts 0000 GMT Saturday.
Ends 0200 GMT Sunday.

Single operator home stations only. Exchange RS(T) report and QTH, VP9 will give RS(T) report and Parish.

Each completed QSO worth 3 points, multiply by number of different VP9 stations worked on each band 3.5 to 2.8 MHz.

Logs go to: The Radio Society of Bermuda, P.O. Box 275, Hamilton 5, Bermuda, before 30th June.

HELVETIA 22 CONTEST
Starts 1500 GMT May 1st.
Ends 1700 GMT May 2nd.

All bands 1.8 to 28 MHz Phone or CW. The same station may be worked on each band for QSO and multiplier credit, but only on one mode.

Exchange RS(T) plus 3 figure contact number starting at 001. Swiss stations will also send 2 letters indicating their Canton. There are 22 Cantons: AG, AR, BE, BS, FR, GE, GL, GR, LU, NE, NW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG, ZH.

Scoring: Each QSO counts 3 points. The multiplier is the sum of Cantons worked on each band. Final score, total QSO points times sum of Cantons on each band.

Mail log within 30 days to USKA Traffic Manager Rene Oehninger, HB9AMA, Im Moos, 5707 Seengen, Switzerland.

ROSS HULL VHF-UHF MEMORIAL CONTEST 1975/76 RESULTS

Trophy winner VK5SU J. W. K. Adams (5th time in a row); 48-hour certificate VK2AMW — Illawarra Amateur Radio Society — operated by VK2ALU, L. E. Patison.

Detailed scores — 1st column 7 day, 2nd column 48-hour.

Section (A) Transmitting Open		
VK5SU	6941	3505
VK2BHO	2227	686
VK3VF	662	271
VK4DT	465	405
VK2HZ	—	191
Section (B) Transmitting Phone		
VK7ZAH	5066	2681
VK4DO	2697	864
VK8ZGF	2335	820
VK6ZED	1978	1406
VK5LP	1865	745
VK6ZDY	1695	705
VK7ZGJ	1621	631
VK1ZRK	1550	515
VK6ZKO	1467	749
VK4ZRQ	1348	514
VK4ZRF	1241	535
VK2ZHT	1072	369
VK5ZTT	871	250
VK3AVJ	828	—
VK2BJF	732	324
VK5ZMM	415	—
P29GA	370	335
VK2BMX	301	125
Section (C) Transmitting CW		
VK2AMW	2950	2950
VK4XA	421	185

No Receiving Logs were received for this contest. ■

USSR Dx CONTEST
Starts 2100 GMT 22 May.
Ends 2100 GMT 23 May.

Bands 3.5-28 MHz CW and SSB, but no cross mode.

Contest Call — "CQ-M". Exchange RS(T) and serial number starting at 001.

Scoring: Contacts between stations on different continents equals 5 points, contacts between stations in the same country count only for multiplier. One country or territory gives 1 point for multiplier per band. Total multiplier is total number of countries or territories from all bands. Add total QSO points and multiply by total multiplier, for final score.

Logs should be sent to: CQ-M Contest Committee, P.O. Box 88, Moscow, USSR no later than 1st July, 1976.

COMMENTS ON THE ROSS HULL CONTEST

Activity this year appears to have increased, judging by the scores of VK5SU and VK7ZAH, in spite of the late announcement of contest dates. The number of logs received is up on last year also, many with worthwhile comments attached.

One very interesting log is from VK2AMW, the station of the Illawarra Amateur Radio Society, operated by one operator, Lyle Patison VK2ALU. Lyle is the Co-ordinator of the Dapto Moonbounce Group. All his contacts were by EME on 70 cm, and the log reads like HF, with calls like W, K, JA, F9, I5 etc. He was operating the group Moonbounce station which has authorisation to run 1 Kw DC input to the final.

Kerry VK5SU sends statistics of stations worked in each State. His overall number of contacts is up 14% on last year, number of different stations up 6%. More stations worked in VK1, VK4, VK5, VK6, ZL, and fewer in VK2, VK3, VK7

CW contacts appear to be on the increase also, which is an interesting trend for a VHF contest. I have found occasion to use it on the UHF bands myself when conditions were not favourable. Russ VK4XA more than doubled his score from last year.

AM activity seems to have almost disappeared apart from 6 metre nets, as everyone seems to be turning to SSB transceive — even on 432!

Several commented on the difficulty of working out contest times in GMT hours but EAST days. It is being considered with the new rules which should be ready for the next contest. I hope to work you all in next year's contest, and please send in a log — you may not win, but it does show that you care. ■

LETTERS TO THE EDITOR

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publishers.

The Editor,
Dear Sir,

In February '76 issue of AR, F. K. McTaggart VK3NW/2BNW, accuses me of woolly thinking in relation to some of the facts in my article "The Golden Years . . ."

After re-reading the article, my researched information, and his critique, it appears that the only error of any great substance, was that I inadvertently gave the prize of first VK/W QSO to Maclurcan instead of Howden. I'm sure Max VK3BQ will accept my apology. Both the aforesaid OOTs made it to the States (A2CM wkg 6EKY) in the same month and year viz. Nov. 1924 so it was a very close thing. I did not credit the first VK/G QSO to Maclurcan; I said he was the first to do this on 20 metres and as far as I am aware, no one disputes it.

My short quote of Shakespeare's line "All the world's, etc", was not another woolly fumble as VK3NW/2BNW also assumed. It was deliberate and needs no apology. A minor bastardisation it

might be but it's one that's often used.

If Mr. McTaggart writes for his "bread", or pleasure, he will know that the constant plea from Editors, the world over, is "make it short and simple". In these interests, some small licence must be permitted.

VK3NW/2BNW admits his criticism of this is pedantic. True, and how pedantic can one get!

My many thanks to those who responded to "The Golden Years . . . ." by saying it revived memories.

Alan Shawsmith VK4SS. ■

The Editor,
Dear Sir,

Those posting QSL cards direct to overseas countries should ensure that the full address is included. Some months ago I forwarded a large packet of QSL cards addressed "Amateur Radio QSL Bureau Box 88 Moscow" — I failed to include "U.S.S.R." Three months later the package was returned to me bearing a written endorsement "TRY U.S.A.", plus a rubber stamp impression reading "ADDRESSEE UNKNOWN IN MOSCOW IDAHOE U.S.A. — return to Sender".

It is hard to understand why the Postal Sorter would think of Moscow Idahoe before Moscow Russia, unless some satisfaction was obtained in sending the package "for a ride" because of my omission.

Bill Bullivant VK2BC. ■

The Editor,
Dear Sir,

I am slowly and surely becoming disenchanted with our magazine, Amateur Radio. I feel that I am in a position to make the remarks I intend to make having been in the 1930-40s, Technical Editor of our worthy publication, and years prior to that, when I first came into the WIA in 1928, I was Victorian branch correspondent to the official organ of the WIA in the days of CQ being published by the Queensland division.

The magazine, to me, has become impersonal and I think is missing its primary role. When I was associated with the magazine, on the editorial staff, it was agreed that Amateur Radio was the Official House Magazine of the WIA for dissemination of news and activities of members to the members. It would seem to me that this has now disappeared and we are out of contact with our fellow Hams throughout the Commonwealth. More importantly, we are not being informed of the activities of each of the Divisions. I remember the first thing we used to read, upon receiving the magazine, were the notes supplied by the Zone and branches of the WIA. The magazine was never intended as a technical journal.

I would invite your attention to other magazines such as QST which features, to a very large extent, activities within districts, provinces and zones in the U.S.A. and Canada. I also used to enjoy station descriptions, one a month, which we published for many years.

In these days of computerisation and other automatic means of communications, including push button Repeater communications, we are heading for more impersonalisation.

I offer the above comments purely as constructive criticism.

R. H. Cunningham VK3ML. ■

20 YEARS AGO

Ron Fisher, VK3OM

APRIL 1956

In 1956 the amateur was troubled with commercial intruders in the HF bands just as he is today. The Editorial page of the April 1956 issue of Amateur Radio took a long look at the problem. They concluded "It's up to each and every Amateur to do some real logging, screening out image reception, and reports of stations operating legally under the treaty. Go to it". Perhaps we did not try hard enough!

With the commencement of television transmissions getting closer most amateurs were rather concerned about the possibility of TVI. For some months the Publications Committee had been on the look out for an article describing an easily built TVI proofed transmitter. The 2YY transmitter was the answer. Described by N. S. Beard VK2ALJ, it featured a Geloso VFO driving a single 6146 in the final, and of course was a "table top" design as distinct from the more usual rack and panel construction of the time. This was to set the pattern for transmitter design in Australia for the next decade.

Also featured in April 1956 Amateur Radio was Hans Ruckert's "Home-Built DX Receiver". Hans always did things on a grand scale and his receiver was no exception.

Volts, Amps and Man. Robert H. Black, M.D. showed the various ways in which man may come into contact with electricity in his environment.

To round out a very interesting issue, data and operating conditions of the QQE03/20 and QQE06/40 were published as well as a few hints and kinks. ■

QSP

NEAR MISSES

From Jan. '76 QST is a note that if a test for a General Class Licence is taken at an FCC examination point, but you miss the code test by only a small amount, you will be given credit for the Technician code element and can go on and take the written part of the exam. But you have to ask.

USA LICENCE RENEWALS

World Radio News of Jan. '76 advised that the FCC in the USA had eliminated the requirement that an applicant for renewal of an Amateur Radio Service licence state that he was able to send and receive International Morse Code at a speed not less than that at which he qualified for the licence being renewed and that he had lawfully accumulated either 2 hours operating time in the last 3 months or 5 hours operating time during the last 12 months. The FCC said the rule was unduly restrictive. A proposed revision of the FCC requirements was that the original of licences must be sent in for renewals. In the past photocopies had been accepted but some applicants had fraudulently altered the originals and submitted the photocopies on which the alterations could not be detected.

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2.08	⅝	8	3	No. 3006	$1.16
2.16	⅝	16	3	No. 3007	$1.16
3.08	¾	8	3	No. 3010	$1.40
3.16	¾	16	3	No. 3011	$1.40
4.08	1	8	3	No. 3014	$1.56
4.16	1	16	3	No. 3015	$1.56
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AWARDS COLUMN

Brian Austin, VK5CA

To mark the year in which Cairns celebrates its centenary, the Cairns Amateur Radio Club is offering a certificate to those who qualify. Rules:

1. All stations outside the Cairns area are eligible. The Cairns area, for Award purposes, is a radius of 100 miles of Cairns.
2. VK and ZL stations must QSO with three Cairns area stations. Overseas stations must QSO with two Cairns area stations.
3. Send a copy of log details of QSOs to CARC VK4HM, P.O. Box 1426 Cairns, Qld., 4870. Awards will be forwarded in bulk via Bureaux unless the cost of post and packing (quarto size) is remitted.
4. The award will be available for the whole of 1976, Cairns' Centenary Year.

Cairns Callsigns: Cairns area stations are the following VK4s: TL YG AE RY HM KV DJ MH AMO NU HK VI VT DB SU NF ZY YT CI QX ZCS ZBU ZNL ZIP ZIB NI.

WAZL AWARD

1. The award is available to all licensed amateurs and shortwave listeners (on a heard basis).
2. Contacts after November 1945 are valid.
3. Do not send QSL cards. A list showing callsigns, branches and other details should be certified by the Awards Manager of a National Society.
4. Endorsements may be claimed for bands and modes. In addition a special endorsement is available if all the contacts were made within a period of 12 months.
5. There is no fee for the award. It is suggested that 2 or 3 IRCs be sent to help defray expenses.
6. The address for applications is:

   NZART,
   Box 489,
   Wellington, N.Z.

Requirements: N.Z. amateurs require confirmed contacts with 45 different branches of NZART. Other amateurs require confirmed contacts with 35 different branches of NZART.

NZART Branches:

1	Ashburton	36	South Westland
2	Auckland	37	Southland
3	Western Suburbs	38	Taumarunui
4	Cambridge	39	Tauranga
5	Christchurch	40	Te Awamatu
6	Dannevirke	41	Thames Valley
7		42	Titahi Bay
8	East Southland	43	Waihi
9	Egmont	44	Matamata Radio Club
10	Franklin		
11	Gisborne	45	Waimarino
12	Hamilton	46	Wairarapa
13	Hastings	47	Waitara
14	Hawera	48	Wanganui
15	Hawke's Bay Central	49	Westland
		50	Wellington
16	Horowhenua	51	Eastern Bay of Plenty
17	Huntly		
18	Hutt Valley	52	Wairoa
19	Inglewood	53	Te Puke
20	Manawatu	54	Patea
21	Manukau	55	Waitomo
22	Marlborough	56	Hornby
23	Marton	57	Tokoroa
24	Motueka	58	Helensville
25	Napier	59	Mangakino
26	Nelson	60	Taupo
27	New Plymouth	61	Central Otago
28	Northland	62	Reefton Buller
29	North Shore	63	Upper Hutt
30	Otago	64	North Otago
31	Pahiatua	65	Papakura
32	Rahotu Coastal	66	Auckland VHF
33	Rotorua	67	Kawerau
34	South Canterbury	68	North Canterbury
35	South Otago		

HAMADS

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- QTHR means the advertiser's name and address are correct in the current WIA Radio Amateurs Call Book.

FOR SALE

Frequency Meter BC221T, complete with charts and built-in stabilised power supply, hardly used, $35. Richard Barnes, 1/21 Baden St., Coogee, 2034 NSW or Ph. (02) 59 0471, 10-5 p.m.

Vinten MTR13, ch. 1, 4, 40 (1 Rx only), 6 ch. capacity, Rx and Tx's well, MPF121 pre-amp in front-end, mute mod., with circuit, $80; FM low band, TCA 1649A, suit 6m or parts, $10. VK3ZMP, 2 Barenya Ct., Kew, 3101. Ph. (03) 80 3704.

Drake R4B Rx in excellent condition, one owner, very late serial number, fitted with a number of extra xtals. Complete with handbook, $400. Ph. (087) 25 2228.

FTV650 6m Transverter, new and unused, in carton and 6m antenna, new, $170 ONO; Hygain 650 AM novice transceiver, 23 channels, all working, service manual, never used, $120 ONO. VK3AZM, QTHR. Ph. (03) 391 3055 bus.; (03) 749 1446 AH.

Yagi 2m, 10 elements, commercial make, ex VK2JH, $10. Mrs. G. Hutchinson, 3 Cammeray Road, Castle Cove. Ph. (02) 406 5065.

Swan 240 Transceiver, 20-40-80, with AC supply, good condition, just been overhauled, $225 ONO; also Eddystone 770U VHF-UHF Rx, 140 MHz to 500 MHz, good condition, $185 ONO. Peter Milne, VK3BEJ, QTHR or Ph. (050) 24 5814.

FT200 Transceiver and power supply (71) with H/B, DC supply and handbook, $320. VK4XV, QTHR. Ph. (07) 59 8570 AH.

Collins Rx Type 51J-4, Serial No. 6935, unmodified and complete with handbooks, but less speaker, $500. Also, near new antenna 18AVT/WB-A, $50. VK3XY, items COD at QTHR. Ph. (03) 97 1265.

Drake R4B Receiver, T4XB Transmitter, MS4 speaker, complete station, all as new $695. VK3OM, QTHR, Phone (03) 560 9215.

Realistic DX160 Solid State Receiver with matching speaker, all as new $140 o.n.o. VK3OM, QTHR, Ph. (03) 560 9215.

Clegg FM27B Transceiver 146-148 MHz, with additional xtals for 145-146 MHz, supplied separately. Handbook and mobile mount, $240. Heath SB610 scope, needs new CRO tube, OK otherwise, $45. VK2WD, QTHR, Ph. (02) 42 6080.

WANTED

Copy or loan of circuit diagram of Palec Signal Generator, type SG 150 kHz to 30 MHz, urgent. T. R. Powney, P.O. Box 32, Ocean Grove, Vic. 3226.

Tiltover and/or Crankup Mast and 20 metre beam or Tribander. Mal Sinclair, VK2BMS, QTHR. Ph. (02) 407 0261 bus.; (02) 95 2362 AH.

Theosophists, or similarly-inclined: Tom House, BA — VK2BTH — would welcome hearing from you. Skeds, preferably CW, eyeball QSOs or correspondence. 34 Wolsely Rd., Lindfield, 2070. Ph. (02) 467 2773.

Good Set (or part set) of TRAPS for Hy-Gain old model TH3 tribander Yagi; also for Hy-Gain TH4. Wanted circuit diagram for Star SR-550 Receiver. Price and details to A. M. McGregor, VK4KX, QTHR. Ph. (07) 36 5385.

Power Transformer for R5223 Communications Rx. Your price paid for reasonable unit. VK2BXF, QTHR. (PC 2113). Ph. (02) 888 2981 AH or (02) 451 5555, ext. 26, bus.

Handbooks and/or Circuits to copy or buy for Hallicrafters Rx — SX111 and Tx HT-32. Peter Milne, VK3BEJ, QTHR or Ph. (050) 24 5814.

Transverters — 6m, 2m, 70cm, to suit FT101, also helical or trap verticals, anywhere in between 160m to 6m. Bob Yorston, VK2CAN. Ph. (02) 646 0317 (9 to 5).

SILENT KEYS

It is with deep regret that we record the passing of —

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G. S. SAMWAYS	VK3OG
P. EVANS	VK3OZ
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MR. R. H. GREENWOOD	VK4NG
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PROJECT AUSTRALIS

David Hull, VK3ZDH

MAY 1976

OSCAR 6				OSCAR 7			
Date	Orbit No.	Time Z	Long °W	Date	Orbit No.	Time	Long °W
1	16196	01.21	75.30	1	6669	00.28	56.89
2	16208	00.20	60.30	2	6682	01.22	70.51
3	16221	01.15	74.05	3	6694	00.21	5[illegible]
4	16233	00.15	59.05	4	6707	01.16	6[illegible]
5	16246	01.10	72.80	5	6719	00.15	53.89
6	16258	00.10	57.80	6	6732	01.09	67.51
7	16271	01.05	71.55	7	6744	00.08	52.39
8	16283	00.05	56.55	8	6757	01.03	66.01
9	16296	01.00	70.30	9	6769	00.02	50.89
10	16308	00.00	55.30	10	6782	00.56	64.51
11	16321	00.55	69.05	11	6795	01.51	78.13
12	16334	01.50	82.80	12	6807	00.50	63.01
13	16346	00.50	67.80	13	6820	01.44	76.63
14	16359	01.45	81.55	14	6832	00.44	61.51
15	16371	00.45	66.55	15	6845	01.38	75.13
16	16384	01.39	80.30	16	6857	00.37	60.01
17	16396	00.39	65.30	17	6870	01.31	73.63
18	16409	01.34	79.05	18	6882	00.31	58.51
19	16421	00.34	64.05	19	6895	01.25	72.13
20	16434	01.29	77.80	20	6907	00.24	57.01
21	16446	00.29	62.80	21	6920	01.19	70.63
22	16459	01.24	76.55	22	6932	00.18	55.51
23	16471	00.24	61.55	23	6945	01.12	69.13
24	16484	01.19	75.30	24	6957	00.12	54.01
25	16496	00.19	60.30	25	6970	01.06	67.63
26	16509	01.14	74.05	26	6982	00.05	52.51
27	16521	00.14	59.05	27	6995	00.59	66.13
28	16534	01.09	72.80	28	7008	01.54	79.75
29	16546	00.08	57.80	29	7020	00.53	64.63
30	16559	01.03	71.55	30	7033	01.47	78.25
31	16571	00.03	56.55	31	7045	00.47	63.13

WANTED

ARTICLES AND PHOTOGRAPHS FOR AR EDITOR QTHR

BETTER THAN FT101E?

FT101 Mark 2, B, or EE plus G3LLL's RF Clipper wins on price and performance — more Rx gain — better selectivity, also variable output control (run any power with full clipping, could solve your RFI or TVI problems, but at least ensures optimum results on all bands, fixed or mobile, and not only on 20 metres! See FT101E Processor instructions) AR test report on G3LLL's clipper — "average two S points gain on transmit", "no loss quality", standard clipper suits FT101 Mark 2, B, E and EE SPECIAL" version for FT101 Mark 1. If in doubt send for details. England's only a post box away. [illegible] $69 Australian; post paid. Clipper usually delivered less than 20 days from when you post the cheque.

G3LLL HOLDINGS PHOTO AUDIO CENTRE
39-41 Mincing Lane, Blackburn, BB2 2AF, England

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UNIDEN 2020 AC-DC transceivers 10 to 80 M. **$550**

TRIO-KENWOOD TS-520 AC-DC transceivers 10 to 80 M. **$530**

YAESU MUSEN FT-101-E AC-DC transceivers 10 to 160 M. **$650**

TRIO-KENWOOD model QR-666 170 KHz to 30 MHz AC-DC receivers **$300**

BARLOW-WADLEY model XCR-30 MK-II receivers **$225**

HY-GAIN ANTENNAS

- 14AVQ 10-40 M. verticals, 19' tall, no guys **$65**
- 18AVT-WB 10-80 M. verticals, 23' tall, no guys **$90**
- TH3JR 10-15-20 junior 3 el. Yagi 12' boom **$135**
- TH3MK3 10-15-20 senior 3 el. Yagi 14' boom **$180**
- TH6DXX 10-15-20 senior 6 el. Yagi 24' boom **$225**
- HY-QUAD 10-15-20 cubical quad Yagi 8' boom **$200**
- TIGER ARRAY 204BA 20 M 4 el. Yagi 26' boom **$190**
- BN-86 balun for beam purchasers only **$18**

ANTENNA ROTATORS

- CDR AR-22 junior for light and vhf beams **$50**
- CDR Ham-II senior for all but 40 M hf beams **$165**
- KEN KR-400 for all medium hf beams with disc brake **$100**

All three models rotators complete with 230V AC indicator-control bix.

4-conductor light cable for AR-22 **20 cents per yard**

12-conductor light cable for Ham-II **30 cents per yard**

8-conductor heavy cable for Ham-II **70 cents per yard**

6-conductor heavy cable for KR-400 **60 cents per yard**

DRAKE W-4 SWR—WATT METER 0-200 and 0-2000 Watt scales **$60**

DRAKE TV-1000 TVI Low pass Filter **$25**

SINGLE METER SWR METER **$15**

TWIN METER SWR METER **$22**

MARK MOBILE ANTENNAS

- Helical 6' long HW-40 for 4o M. **$18**
- High power KW-40 for 40 M. **$25**
- HW-20 for 20 M. **$16**
- Tri-band HW-3 for 10-15-20 M. **$25**
- Swivel mobile mount and chrome plated spring for all **$12**

ASAHI MOBILE ANTENNAS

- AS-2-DW-E ¼ wave 2 M. mobile whip **$8**
- AS-WW ⅝ wave 2 M. mobile whip **$18**
- AS-GM gutter clip mount with canle and connectors **$10**
- M-RING BODY MOUNT AND CAP FOR ¼ M. whips **$5**

CUSH CRAFT ANTENNAS

- Model DGPA 52-27 MHz adjustable ground plane **$25**
- LAC-2 lightning arrestors **$6**
- Model AR-2 RINGO ⅝ waves verticals **$20**
- AR-2X RINGO RANGER double ⅝ waves verticals **$35**
- ARX-2 extension for AR-2 **$15**
- A147-20T combination vertical-horizontal 2 M. Yagis, 10 elements each **$60**
- A147-11 11 elements 2 M. Yagi **$30**

CRYSTAL FILTERS 9 MHz, similar to FT-200 ones, with carrier crystals **$35**

FDK MULTI-7 2 M. FM 10 Watt transceivers with 12 sets of crystals, available all 7 repeater and anti-repeater frequencies plus channels 40, 50, and 52 **$225**

KYOKUTO 2 M. FM 12 Watt output transceivers with digital read-out and crystal synthesized PLL circuitry, 400 5 KHz transmit and 1000 5 KHz receive channels for normal simplex, repeater and anti-repeater operation **$300**

ICOM IC-202 2 M. SSB handy transceivers, 144.0-144.4 MHz **$185**

AUTOMATIC MORSE KEYERS EK-150 with built-in squeeze key paddle AC operated with monitor **$75**

FERRITE CORE BALUNS cheaper Japanese product for up to 500 W RF **$12**

COAX CABLE-CONNECTORS-SWITCHES Amphenol type male, female, angle. T-connector, double male, double female, even female cable connectors!!! **all 100 cents each**

3 Position coax switch, when they at last arrive! **$8**

RG-8-U foam insulation cable, low loss ⅜" diameter **80 cents per yard**

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Add $1 cutting-handling cost for coax and rotator cable orders.

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TRIO-KENWOOD DIP METERS Model DM-800 0.7 to 250 MHz few only **$60**

27 MHz TRANSCEIVERS 5 Watt AM 6 channels with 27.880 MHz crystals **$75**

- 1 Watt hand-held 3 channels 27.240 crystals **$50**
- 15 Watt PEP 23-channels AM/SSB model SE-501 **$175**

All prices quoted are net SPRINGWOOD, N.S.W. on a cash with order basis, sales tax included in all cases, but subject to changes without prior notice. No terms nor credit nor C.O.D. facilities, only cash and carry, no exceptions. ALL RISK INSURANCE from now on free with all orders over $100, small orders add 50 cents for insurance. Allow for freight, postage or carriage, excess remitted will be refunded.

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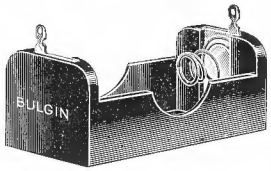
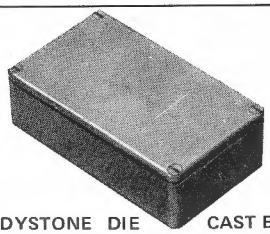
The word Eddystone is synonymous with quality communications receivers used throughout the world. 10 KHz to 870 MHz. (Send for a short form catalogue).



BULGIN BATTERY HOLDERS
In this day of battery operated equipment some device to hold batteries is essential from 1 to 3 cells in popular sizes.



EDDYSTONE DIE CAST BOXES
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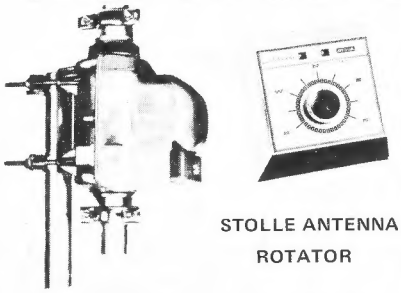
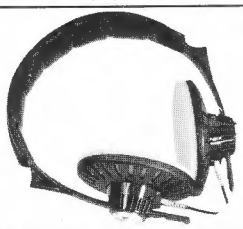
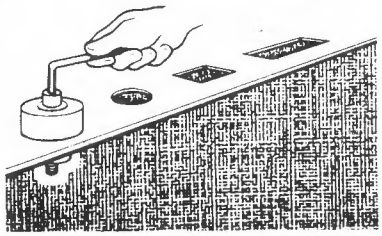


STOLLE ANTENNA ROTATOR
An antenna rotating device where the motor and support bearing are mounted on the antenna mast and the control unit on the equipment operating table.



SENNHEISER HEADPHONES
The Sennheiser "Open-aire" stereo headphone range needs no introduction to Hi-Fi or professional users. These headphones not only have exceptional reproduction (20—20,000 Hz) but weighing only 5 oz they can be worn for long periods without fatigue.



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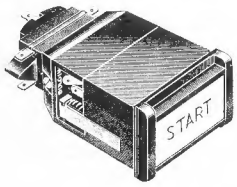
This cutter is made from tool steel and will give exceptional life. Sizes 3/8" diam. to 3" diam., plus 1" and 11/16" square, and 21/32" x 15/16" rectangular.



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There is one for nearly every application, from instruments to control units. Fully illustrated in the Bulgin catalogue available on request.

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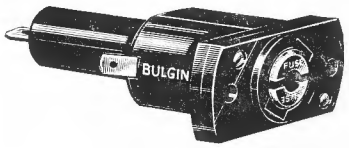
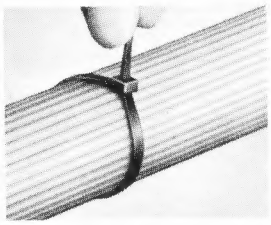
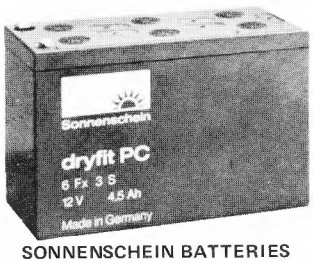
A complete range of PA equipment from the mike to the speaker through amplifiers, mixers, etc, is available.



BULGIN FUSE HOLDERS
There is a Bulgin fuse holder for practically every type of installation including open, screw-in fuse cap, line cord, etc.



PANDUIT WIRING COMPONENTS
Cable harnesses must be tied, hung, mounted, identified and ducted. A full line catalogue is available upon request.



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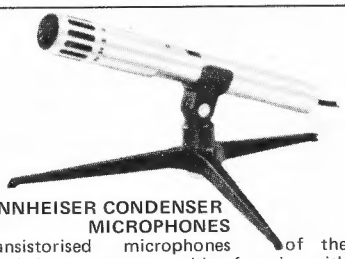

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